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The AUTOMOBILE

1915

A Master Moulder in Fashioning The Industry

¶ The Year in Review, Showing Those Dominating Tendencies of the Year, Those Industry-Building Forces That Are Impelling the Automobile Industry and Those Rewards That Are the Fruits of Judicious Investigation, Shrewd Planning and Bold Operation

THE year 1915 will, in the perspective of decades, be recorded as an epoch-making year in the automobile industry, a year unprecedented in the breadth of evolutionary movements as well as in the variety of them; epoch-making from a production viewpoint, with a possible output of 892,000 automobiles being manufactured in the calendar year, this including cars and trucks; epoch-making to the engineer as witnessing the introduction of the twelve-cylinder motor, confirming the engineering judgment that led to the introduction of the eight a year ago and establishing the permanency of the high-speed motor with its light-weight parts. Epoch-making in the general expanse of factory facilities and equipment in that over $15,000,000 was expended in factory additions, and added equipment, this during the year when many industries were not working at capacity, due to depression attendant on belligerent conditions in Europe; epoch-making because of the unprecedented demand at home for automobiles and motor trucks, a demand in which lies the reason for the phenomenal growth, although many would attribute it to war requirements of a mushroom nature, which unquestionably had their influence. Epoch-making because of the exceptionally large increases in capitalization of many large companies and the re-financing of them on a scale hitherto adopted by the few; epoch-making to the wage earner, due to a wider extension of profit-sharing principles, assuming the form of division of profits with employees, higher wage scales, shorter hours, and improved sanitary factory conditions; and epoch-making in that the metal markets have reached new levels, due to shortage of raw stocks, occasioned by the increased demand on the market from other industries that were directly influenced by the war.

Important Patent Decisions

AFTER having been reared in an atmosphere of patent litigation, the automobile industry, through its governing body, the National Automobile Chamber of Commerce, Inc., has made a herculean effort to do its part in solving the patent problem which has been so disturbing from the day when the Selden patent was first placed in court. To do this, the national organization adopted a cross-licensing plan by which owners of patents agreed to extend shop rights on these to other members of the association who reciprocated. Sixty-nine companies controlling over 900 patents agreed; an

action which augurs well in solving the patent problem.

Several patents have been adjudicated during the year, among these being the Conrad patent controlled by the Hess-Bright people, and referring to annular ball bearings with a continuous metal rim on which the balls between the two races bear. This patent was declared valid and the Hess-Bright company has already licensed several companies under the patent.

The electric horn patents, known as the Hutchinson patents, controlled by Lovell-McConnell, were declared invalid, the court holding not only that the claims were invalid, but that those claims covering special details were not infringed by the Sparton horn, the defendant in the suit.

A patent which was speedily adjudicated during the year was that known as the two-speed axle, owned by the Austin Automobile Co., and alleged to be infringed by the Cadillac Motor Car Co. The court held the Austin patent on a two-speed axle valid, and infringed by Cadillac. Cadillac was enjoined from making or selling new cars with that type of axle, but permitted to use, repair and sell its cars using the axle.

Another patent adjudicated was the Hanlon adjustable windshield, using a double glass, which can be placed at an angle, forming a roof to keep rain or sleet from the vertical pane. This patent alleged infringed by Rauch & Lang and the National Automobile Chamber of Commerce, was declared valid and infringed. Some manufacturers have taken out royalties and the majority of N. A. C. C. members infringing have ceased its manufacture.

An important patent, which has been in the courts for years, affecting the tire industry, was that relating to the use of metal cores in tire manufacture and known as the Thropp patent. The courts have recently ruled the patent invalid, holding that it was anticipated in that different tire concerns were using the metal mold in 1903 and 1904, thus constituting anticipations.

The Lindsay Auto Parts Co.'s patents on floating rear axle construction were declared valid. The Winton Co. was the defendant, having used this construction four years ago, but since discontinued it.

Litigation has proceeded throughout the year on the Kardo patents in the suit against Studebaker, the matter being still in the courts. Certain decisions in connection with these patents have been handed down. One patent in question referred to ball bearing steering knuckle construction, the defendant being the representative of the Chalmers Motor Co. The court held the patent was void for want of patentable novelty and invention. Another Kardo case, with respect to differential construction and brought against the Reo company, was dismissed by the court on the ground that the Kardo Co. was not lawfully organized under Ohio statutes.

An important patent adjudication was that of the Perlman patent covering a form of demountable rim which is generally in use. The Standard Welding Co. was defendant. The court decided the patent valid and infringed, and gave Perlman exclusive rights under it.

Several other patents are still in the courts, among them being the carbureter patents controlled by Stromberg.

What is known as the Motometer patent granted to Harrison H. Boyce has been declared valid, the court holding that in the patents cited as prior to the Boyce one there were no anticipations.

Exports Approximate $115,000,000

EXPORTS of automobiles, motor trucks, and parts for the calendar year, ending Dec. 31, 1915, will approximate $115,000,000 as compared with $28,000,000 for the calendar year ending Dec. 31, 1914, this representing a four-fold increase. The number of trucks exported for the first ten months of the year aggregate 20,514, which is a new high water mark. Passenger car exports reached the total of 32,965 cars. While much of the export business was due to war orders, particularly in the motor truck field, the figures have been heavily increased by the added export of parts in which are included motor truck and automobile tires, these parts totaling over $12,000,000, approximately four times what they were during the previous calendar year.

American exports have increased heavily during the first ten months through countries other than those engaged in the European war, a notable example being Australia, where for the first time the American car exports exceeded in value those from Great Britain, according to official figures of the Australian Government.

Three Controlling Factors

Three controlling factors have entered into the export business during the past year. For the first time in its history England placed an import duty of 33 1/3 per cent on cars and parts entering the United Kingdom, tires being excluded from this arrangement. This duty in contrast with Britain's free trade principles will show its effect. The duty took effect Oct. 1 and it has not been possible to judge its influence as yet. France is to-day talking of an import duty of 45 per cent which, if enforced, will practically quadruple import duties. Should France enact such a measure, it will mean a heavy revenue to these countries on post-war business, which the American manufacturer will, of course, have partially to pay.

Still a third factor is the rubber embargo by which the United States is prevented from exporting rubber goods of any nature to any European countries excepting the Allies. This arrangement was effected in February, and under it the American tire manufacturers have secured all the necessary supply of crude rubber, all of which is consigned to the British Consul General of New York for distribution. Under the terms of the embargo rubber goods cannot be exported to neutral European nations or the belligerent enemies of the Allies.

Export business with South America has not de-

veloped as anticipated, due to the enormous increase of demands at home for cars and poor shipping facilities to South America, Australia and other places. All told, 1915 cannot be considered as a healthy export year from the American manufacturers' viewpoint, this notwithstanding the fact that exports to Europe have quadrupled. This has been due much more to Europe coming and buying the goods than to Americans developing the market.

Unprecedented Factory Financing

THE closing year has witnessed more factory financing and more combinations of interests than have been experienced since the formative days of the General Motors, the United States Motors and U. S. Tire. General Electric has been the big outside organization that has become a factor, having during the past twelve months secured large interests in what were five individual concerns at the start of the year. It first secured greater interests in the Peerless and General Vehicle companies, in which it previously held interests, and merged these in the Peerless Motor and Truck Corp. Since then it has secured a considerable interest in the Entz electric transmission by purchasing an interest in the Owen Magnetic Co., building cars with this transmission, and thereby securing control of the Entz patents. Following this came a merger of the Owen Co. with Baker-R. & L. which concern will build the Owen cars, the General Electric securing its representatives on the board of directors of the manufacturing concern.

The second outstanding financial development has been the refinancing of the White Co. by New York and Philadelphia interests, increasing the capital to $16,000,000, and thus bringing new influences into the organization, which is changed in name to the White Automobile Co.

A third far-reaching financial development was the recent entry of money representing the Swift packing interests in Chicago into the Briscoe organization, which has already resulted in the concern purchasing outside factories, including that of the Lewis Spring and Axle Co. and some other plants. The outcome of this new capital and the Swift influence can be looked upon as particularly conspicuous.

A fourth large financing deal is definitely reported to be under way in Indiana in which several Hoosier automobile and parts makers are uniting, the ostensible object being to insure an adequate supply of car components, among the concerns mentioned being Cole, Auburn, Inter-State, Westcott, Peru Auto Parts and Parker Auto Parts Co.

Great Increases of Capital

In addition to these large merging and extending interests there have been many instances where outside capital has been brought into organization and capitalization doubled, all preferably for reasons of increased production. Then again other large organizations have heavily added to their capitalization to care for the natural growth. In a word, it has been a year of great financing, a fact which indicates that money came easy to the automobile companies, the enormous advertising of certain automobile war stocks and others not in the war column being largely responsible. Some of the more conspicuous increases in capital stock are as follows:

Overland has authorized the increase of common stock from $25,000,000 to $50,000,000 and has authorized the issue of $15,000,000 of 7 per cent preferred. Ford has increased from $2,000,000 to $100,000,000, only one-half of which can be issued under the Michigan laws. Chevrolet increased from $2,500,000 to $20,000,000. The capitalization of the Hupp company has been increased from $1,000,000 to $6,500,000 and the company has recently purchased a new plant for axle manufacture.

The Saxon company, an organization less than two years old, has increased from $350,000 to $6,000,000. Chandler, also a relatively new organization, has increased from $425,000 to $10,000,000, and is rapidly expanding its factory. Simplex has taken over the Crane interests, and increased its capital from $1,500,000 to $5,000,000. Franklin has increased from $900,000 to $2,000,000.

With automobile concerns increasing as these figures indicate, there must naturally be corresponding increases in some of the accessory lines, the past year being a very busy one, chiefly with the manufacturers of parts and tires. One of the leading activities has been the recent purchase of the Federal Rubber Co. by the Fisk company, the latter having added $500,000 preferred. The Federal capitalization was increased in January $1,000,000. Republic increased its preferred stock by a $3,000,000 issue, and Ajax has within the last week increased its capital from $118,500 to $5,000,000. There have been many other increases in the rubber field, including $1,000,000 added to the capital of the Hood Co.

Capital increase among the makers of component parts was led by the Continental Motor Mfg. Co., increasing from $500,000 to $2,900,000. Gray & Davis increased from $1,750,000 to $2,000,000, and the Hayes Wheel company from $300,000 to $1,000,000. Perfection Spring raised from $1,500,000 to $2,500,000.

Huge Stock and Cash Dividends

With such enormous financing propositions recorded during the year it is not surprising to read of some fabulous stock dividends as well as extra cash dividends, a few of which will suffice to show the earnings in some of the larger organizations. Ford divided $48,000,000 in stock dividends and rebated $15,000,000 to car purchasers. Chandler distributed a stock dividend of 77½ per cent, making a total of 100 per cent for the year. Haynes doubled its capital and declared 100 per cent stock dividend. General Motors paid its first dividend of 50 per cent. Continental Motor declared a stock dividend of 100 per cent; Hayes Wheel, 166 per cent; Canadian Ford Co., 600 per cent, and Fire-

stone tires 16 per cent. Republic truck 100 per cent.

Unprecedented Factory Activity

THE past year has been one of unequaled activity in the building of new factories, adding additions to existing plants and installing with machinery equipment. Approximately $15,000,000 has been spent in this work, this sum being a conservative estimate on a vote representing perhaps 70 per cent of the more active element of the industry. Car, truck, accessories and parts makers have all shared in this building activity.

Approximately 12,000,000 sq. ft. of floorspace has been added, the car makers alone adding 6,000,000 sq. ft. and truck makers 500,000 sq. ft. Tire makers, who have profited by increased protection and war orders, have added over 2,000,000 sq. ft. Some of the other accessory manufacturers who have made great increases are those building axles, gears, motors, carbureters, starters and springs.

Of the total of approximately $15,000,000 spent in buildings and equipment, over half has gone into new buildings and the remainder into new machinery. The past year has been a record one in the development of automatic machinery designed to increase production and reduce cost. This machinery has been demanded by the enormous production increases and has been made possible by the standardization of parts and the general simplification of design. Automobile manufacturers now recognize that a part must be designed for engineering requirements, but also to meet the requirements of production, and this influence has been felt more during the past year than ever before.

S. A. E. Pushes Standardization

THE Society of Automobile Engineers, the national engineering organization of the industry, has not only sustained but greatly increased the interest of the industry in its work, particularly that of standardizing vehicle parts and specifications of metals. This standardization work has been in progress for several years, but only during the past season have the manufacturers had an opportunity of appreciating the advantages of standardization. In the steel field the adoption of standard specifications for different steels has practically offset what would otherwise have been a quite considerable increase in steel prices during the past year.

Two influences have been started to assist this standardization work during the year, one being the opening of a Detroit office for the benefit of the standardization work, and the other a new mode of procedure in voting on standards by mail, a movement which has very perceptibly broadened and made more representative the balloting of different standards.

The society early in the year moved to the Engineering Building, 29 W. Thirty-ninth Street, New York City, a building occupied by allied engineering associations, and an ideal home for the society. In addition to a slightly increased membership during the year the society has grown by forming two sections, the Mid-West in Chicago and the Pennsylvania section in Philadelphia. These, added to the Metropolitan section in New York, and other sections in Detroit, Indianapolis and Cleveland, give a total of six, all of which have been active during the year. The section meetings in Detroit and Indianapolis have been particularly conspicuous by their enormously increased attendance, attributable to the subjects being very pertinent on current engineering topics, such as eight and twelve-cylinder motors, aluminum pistons, and other equally pertinent subjects. The discussions provoked have been remarkable for their interest and value.

Great Engineering Development

THE past year has been prolific in engineering development, those who believed that the automobile chassis had reached or approached the ultimate design being entirely upset. It was expected that the European war closing the doors to the engineering laboratories of the Old World would have its effect, but instead of a dearth there has been greater engineering activity displayed than ever before in the industry. This new wave began a year ago with the introduction of the eight-cylinder motor, then an experiment, but which has now taken a permanent place in the industry universally accorded it. Closely following this came the twelve-cylinder V-type motor, announced during the past year, and which has already been adopted by five concerns, and is now in the production stages. Both of these movements are distinctly American. Although both types of motors originated in Europe, yet it remained for America to develop them to the practical stage where confidence was strong enough to make them stock equipment in a single-model program.

Chassis Are Simpler

The year has been one of simplification in automobile chassis design due largely to the fact that there have been few, if any, upheavals occasioned by adding unexpected accessories, such as were precipitated three years ago when the starter movement was launched a few months before the automobile shows and completely upset production in many factories. To-day electric starting and lighting are corporate parts of the chassis and are not after-thought attachments. This was realized nearly eighteen months ago, so that to-day the engine starter and electric generator are as integral portions of the car as axles or gearbox.

The simplification of design has extended to other portions of the chassis, notably the brake connections, where there is commendable improvement. Motor simplification has resulted from the more general use of the side-outlet carbureter by which the intake manifold is eliminated, this being made possible by the increased use of vacuum-gasoline feed, permitting of placing the carbureter high on the side of the motor chassis. The more general use of block cylinder castings and designing the gearbox as a unit with the motor have aided in this work.

A conspicuous movement of the year has been the increased attention given the double sleeve valve type of motor built under Knight patents. Heretofore this type of chassis has commanded above the average figure, but for 1916 the Knight-motored chassis has been brought to the $1,000 zone and now there are three different concerns manufacturing these cars to sell between $1,000 and $1,500. The taking up of this motor for production purposes by Willys-Overland will doubtless do much to popularize it with the medium-priced car buyer.

The advent of the eight-cylinder and twelve-cylinder motors, with their necessarily small diameter cylinders, has given impetus to the development of the high-speed motor. The Cadillac eight, the pioneer V type, must be considered the first high-speed American motor, and its practical life has been largely responsible for the development of this type of motor. Higher crankshaft speeds have been largely assisted by reduced weight of pistons, and in this connection the use of aluminum alloys for this work has been definitely accepted by the engineering fraternity. No longer is the practical use of the aluminum piston questioned. Aluminum has made further progress in that it is now being used for cylinder castings as well.

State Laws Little Changed

Little new has developed in the way of State laws with the exception of the Michigan law, which requires a registration fee at the rate of 25 cents per horsepower and 25 cents per hundredweight of car. New Jersey required the carrying of mirror-scopes on commercial vehicles, a regulation which has not worked out satisfactorily, as truck vibration is too great for these devices. Maryland obtained a decision declaring that non-resident motorists must take out licenses when using the Maryland highways, the measure working particular hardship against motorists of the District of Columbia. The Illinois wheel-tax was declared illegal, but motorists agreed to continue it as the money so collected goes for road maintenance.

The year has been a particularly active one with police departments in large cities enforcing speed ordinances with rather injudicious sway. There has been too much of arresting on the letter of the law and not the spirit. New York has started imposing fines for electric dash lights which are said to violate the anti-glare ordinance.

One of the most important decisions of the year, as applying to speeding, was that in which a New York motorist was fined for speeding 30 m.p.h., a violation of the state law which specified 30 m.p.h. with reasonable safety, in the country. The motorist established the fact that he was driving with reasonable safety in the open country and on a clear road. The judge so ruled and refunded his fine which had been previously imposed. This decision is of particular importance as the clause "with reasonable safety" is incorporated in many of the state statutes and where it is not so included should be.

The National Automobile Chamber of Commerce, Inc., the controlling body of the industry, has done valiant service during the year, as already mentioned, in coping with patent litigation. Its membership is now ninety-eight, having increased fourteen since Jan. 1, a growth of approximately 16 per cent. In addition to a truck convention which it held, the chamber has been establishing service organizations in different cities, which should prove of special value to the industry.

The national organization of parts and accessory makers is known as the Motor and Accessory Manufacturers. At present it has 240 members, representing the major accessory and parts industries in the country. This association has continued its valuable credit service to its members and has extended this in some respects.

A Banner Contest Year

THERE has never been a more active year in automobile contests than 1915. It marked the entry of the specially-built speedway on a large scale, six specially constructed speedways having been constructed during the year, which, added to the three previous ones, gave a total of nine tracks. On these nine tracks was a program of events scarcely considered possible a year ago, and for which the prize money actually distributed in cash totaled $282,000. Never before has automobile racing in this country, or abroad, or any other place in the civilized world, received such reward. Over $3,000,000 in cash was expended during the year in building the chain of speedways and improving the existing ones. New York led in the expenditure, exceeding the $1,000,000 mark, followed by Chicago, Minneapolis, Omaha, Des Moines and Providence.

As a reward for these enormous investments and prize moneys, America witnessed for the first time contests won at speeds well over 100 m.p.h. and saw individual performances that came close to capturing world's speed records. The highest speed record remains in the Old World, on the Brooklands speedway, but it is expected to come to America as soon as speedy enough cars have been developed, as America has one or two speedways credited with being the fastest in the world.

During the year, manufacturers have availed themselves of these new speedways by making numerous certified trials, a movement which it is hoped will gain headway during the coming season.

Heavy Automobile Registrations

THE past summer saw the total of automobile registration exceed the 2,000,000 mark. The tables compiled from state returns by THE AUTOMOBILE showed 2,070,000 registered up to July 1. It is a conservative estimate that registrations to date approach 2,400,000. New York leads all other states in registration, having 231,713 cars registered in November. California, which held second place for several years, is now fifth, with Ohio, Illinois, and Pennsylvania leading. Iowa is in sixth place, with a total of 140,000. Approximately 10 per cent of all the cars registered in the country are registered in New York State.

S. A. E. Influence Spreads During 1915

New Sections, New Divisions and New Standards Are Features of Society's Increased Activities

FOR the Society of Automobile Engineers, the year 1915 will be a memorable one for its accomplishment along all three lines of activity—professional, standardization and social. W. H. Van DerVoort, president of the Moline Automobile Co., was elected president of the S. A. E. on Jan. 6, and under his leadership the year has been one of general progress. High spots of the past twelve months have been the adoption of fourteen new standards, the formation of new divisions for silent chains and for international co-operation, with the view of obtaining some world-wide standards, the formation of S. A. E. sections in Chicago and Philadelphia, the appointment of two members to the naval advisory board and other activities of the year, while the discussion in the general and section meetings of a wide range of useful and instructive topics must not be overlooked.

Standards Committee Work

Two activities which have received much attention from the S. A. E. during the year are the work of the standards committee and that of the various sections. The notable points in the work of the standards committee, which this year has been under the direction of K. W. Zimmerschied, of the General Motors Co., have been concerned in carrying through work which has been under advisement for a long period. Among the most important standards of the year are: the new iron and steel list, vertical carbureter flange, standard tire sizes, electric vehicle ratings and nomenclature for spring parts adopted during the January and June meetings. Considerable progress has also been made by the electric vehicle, ball and roller bearings, truck standards, chain and lock washer divisions.

The Summer Session

The summer meeting of 1915 was held on the waters of the Great Lakes, the members cruising through the 30,000 islands of Georgian Bay in the Steamship Noronic. The vessel touched at Midland, Ont., and smaller steamers carried the party through the narrow island channel to Parry Sound. The trip covered four days, from June 13 to June 17. This summer meeting was characterized by excellent attendance and was particularly noticeable for the fact that men vitally concerned with the subjects under discussion took part in the debates. The feature of the meeting was the discussion on the eight and twelve-cylinder motors.

The Detroit, Indiana and Metropolitan sections have had monthly meetings throughout the winter, spring and fall, and as a result the work of the sections has received a forward impulse which cannot fail to be of considerable value to the parent organization. The fine attendance at the Detroit meetings has been the section feature of the year. Some of the papers which have been on the program of the Detroit section during the year have been on the subject of scientific chassis design, reasons for the twelve-cylinder motor and aluminum alloy pistons. Attendance at these meetings has run up well around the 300 mark.

The Indiana section has discussed the eight- and twelve-cylinder motor also, from various angles and, in fact; has had two meetings devoted to the subject, one in February when the eight and twelve were discussed regarding their basic principles, and then again in November, when C. S. Crawford, chief engineer of the Cole company, talked on the eight-cylinder motor in answer to the arguments for the twelve presented by J. G. Vincent, vice-president of engineering of the Packard company.

Activities in the Metropolitan section during the year have embraced a complete winter, spring and fall program, and reports of research committees of the section have been particularly important. The gas-electric research committee gave a preliminary report in February and another progress report in November.

Mid-West Section Established

In October a section of the society was established in Chicago which has been named the Mid-West Section and embraces all the territory of which Chicago is the natural metropolis. The following month, in November, a section was established in Philadelphia known as the Pennsylvania Section and this will take in parts of New Jersey, Delaware, and a considerable portion of Pennsylvania.

In carrying out the business of the Standards Committee it has been found advisable to leave the final decision as to whether or not a proposal should become a standard up to as many of the society as feel themselves capable of passing on the questions. For this reason standards are now accepted by mail vote and after a standards proposal or recommendation has been passed upon at a general meeting the ballots are sent to the membership at large, thus securing the maximum number of votes.

The Winter Meeting

One of the points brought out at the summer session was regarding the advisability of having the winter meeting extend over but one day. On reconsideration of this it has been thought advisable to have the standards committee meeting on a separate day in order to leave the one day of the session open to nothing but the president's address and professional work. This plan will be attempted with a view toward increasing the attendance at the winter session, where the business of the show is very apt to cut into the available membership unless the work can be concentrated in such a manner that the S. A. E. members in New York at the time of the show will be able to arrange their business so as to be able to attend the meeting.

In May the Society of Automobile Engineers changed its headquarters from the Rubber Building, at Columbus Circle, New York City, to the Engineering Societies Building, which is devoted entirely to engineering organizations. In connection with the new building, there is a library on engineering subjects which is open to the members of the Society and also better meeting facilities than were provided in the Rubber Building, which was intended primarily for offices.

A permanent location has also been established in Detroit. This Detroit office is primarily to aid in the standards work and a recorder for the standards committee is established there to attend to the clerical work of the organization. In carrying out their duties, members of the standards committee now receive mileage allowance and in place of the semi-annual meetings, the standards committee now manages to hold a session quarterly. These meetings are held about mid-way between the two semi-annual general meetings and also in connection with the latter. During the past year the standards committee met in Detroit in April and at Chicago at the time of the founding of the Mid-West section in October.

Membership Total Now 1783

In point of membership the society is again being favored by an upward trend. During 1914 there was a revision of the membership list which resulted in fewer names being upon the list. January 1, 1915, there were 1746 members of the S. A. E. On December 20, 1915, there were 1783. The membership of the sections is also increasing and the rule which permits of section associates who are not members of the parent body, has been taken advantage of by some of the sections, thus establishing a wider circle than the total figure would indicate.

1915—A Record Year for Speedways

Six New Speedways Opened—Races Won at Over 100 M. P. H.—Many Certified Trials—Few Accidents—End of Long Races

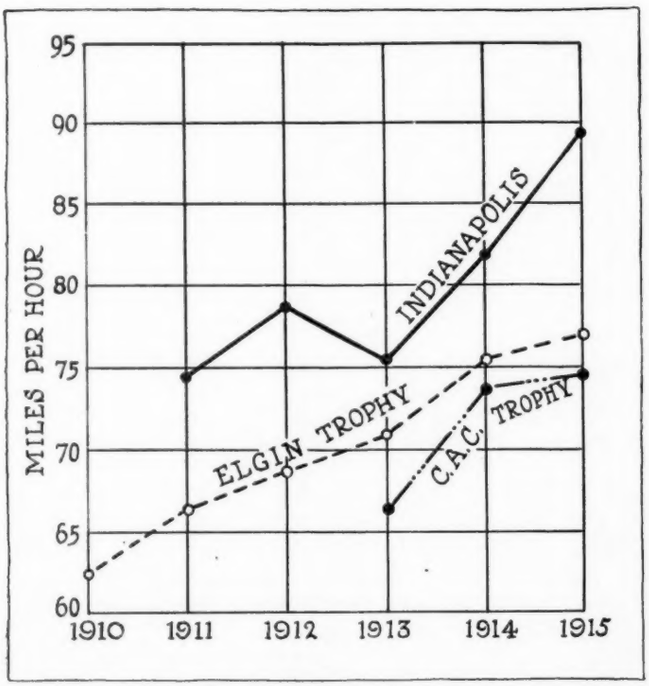
THE year 1915 has been epoch making in automobile contests largely due to the opening of three new motor speedways, in New York City, Chicago, and Minneapolis, all three with scientifically banked tracks making speeds of 100 m.p.h. not only possible in long-distance races but making it possible to establish world record marks in America as soon as faster cars can be made. Indianapolis has been relegated into about seventh place as a speed track, the new speed order being New York, Chicago, Minneapolis, Tacoma, Omaha, Des Moines, Indianapolis and Sioux City.

Nineteen hundred and fifteen has witnessed the passing of the 500-mile race and also the $50,000 purse, and for 1916 the 300-mile event for $30,000 will be the highwater mark.

The 1915 season was the greatest duel between American and European cars the world ever witnessed, Stutz and Duesenberg valiantly upholding America against superior numbers of Peugeot cars supported by Delages, Mercedes and Sunbeams. Although Resta, with the Peugeot, was perhaps the most spectacular figure in road and speedway events the palm of victory in both went to Stutz with its new valve-in-the-head design of racing motor.

For the first time in history the world has seen a race of 350 miles won at over 100 m.p.h. and on three different occasions has seen 100-mile events won at well over that figure, the fastest being 105.30 m.p.h., as against 82.47 in 1914.

An innovation were the 100-mile invitation races, one in Chicago and one in New York. Both events were won by Resta in a Peugeot in record time. The first event was made in 58:42.2 or 101.86 m.p.h., while the second event's time was 56:55.71 or 105.39 m.p.h., just 26 sec. behind the world's record created at the Brooklands track.



A chart significant of the great increase in speed in races of the past year. This is a comparison of the only three big events run over the same course and for the same distance each year, giving a fair basis of comparison

In the fourteen speedway events, the average speed of each winner was raised from 76.48 m.p.h. in 1914 to 87.23 m.p.h., and the average of each car that finished from 72.57 m.p.h. to 81.32 m.p.h.

Officially, only five new records were made in 1915, namely those made by Burman in a Peugeot on the 1-mile circular dirt track at Bakersfield, Cal., Jan. 3, for 10, 15, 20, 25 and 50 miles. New speedway marks were made from ½ to 500 miles. The Brooklands records of 200, 300, 400, and 500 miles were also broken, the new times being respectively, 1:56:21.40, 2:55:32.23, 4:04:49, and 5:07:26.

One dominating conclusion from the 1915 racing results is that one reason for the increased speed was the correct banking on the new board speedways. Then again the use of aluminum pistons, bigger valves and better steel, and fewer tire troubles, contributed greatly toward the attainment of new speed records.

The Drivers' Share

The drivers in 1915 were offered in the fourteen speedway events purse money totaling $282,000. Ten drivers, out of a field of fifty-six competing, divided $217,900. Resta earned $37,750; Anderson, $37,000; Cooper, $31,750; De Palma, $24,600, and Rickenbacher, $24,000. The rest of the drivers mentioned received purses ranging from $19,000 down to $10,000. The remaining $52,800 was split between twenty-five drivers.

Though the number of sanctioned contests in 1915 was smaller than in 1914, there being ninety-eight as against 120 granted by the Contest Board of the A. A. A., more class races were seen than in former years. Twenty-three major caliber events were held as against seventeen in 1914. There was a falling off in dirt track events, which numbered only fifty-nine as against eighty-eight in 1914. Certified trials and fuel economy tests were fewer with only six as against twelve in 1914. The number of road races was twelve as against ten in 1914. Four hillclimbs were held, at Uniontown, Newport, Ind., Utica, and Spokane, as against two in 1914 at Uniontown and Atlanta.

Road Racing Gains in West

Road racing in 1915 was especially prominent in the Middle West and on the Pacific Coast where several important 300-mile events were held. Most of the road racing in the early part of 1915 was on the Western Coast where such events as the 305-mile Point Loma race was held Jan. 9, the winner being Cooper in a Stutz who averaged 65.05 m.p.h. The Grand Prize race, a 400-mile event held at the Panama-Pacific Exposition, was won by Resta in a Peugeot at 57.5 m.p.h. The 300-mile Vanderbilt, held on the Exposition course, was also won by Resta at 67.2 m.p.h. The closing of the road racing season on the Coast was the 300-mile Venice, Cal., event won by Oldfield in a Maxwell at 68.8 m.p.h.

High Marks at Elgin

New records were established for the 301-mile Elgin and C. A. C. trophy road races. The Elgin Aug. 21 race was won

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Industry Adds 11,142,508 Sq. Ft. in 1915

Partial Returns Show Large Expansion in All Branches of Manufacture—Additions and New Equipment Represent $13,060,345

DURING the year 1915, companies actively engaged in the various branches of the automobile industry increased the capacity of their manufacturing plants by the addition 11,142,508 sq. ft., at a cost of approximately $10,000,000 to $15,000,000 and added new machine equipment, etc., representing $500,000 to $10,000,000 these estimates being very conservative. The returns received by THE AUTOMOBILE in response to letters inquiring as to the factory enlargements made throughout the industry, while by no means complete, show a total increase in area of 11,142,508 sq. ft. for the year in all branches of the industry, the cost of additions, also frequently not available, being $8,251,755. New equipment worth $4,770,590 was purchased during the past twelve months, making the total expenditure for greater factory facilities by those companies of the automobile and allied industries given in the accompanying tabulation $12,886,345.

To give an idea of the tremendous extent of this expansion throughout the industry, using the incomplete statistics available as a basis, if the total floorspace added in the past year represented but one huge single-story structure 100 ft. wide instead of hundreds of buildings, it would be 20.9 miles long. As an illustration of the magnitude of the sum expended for a part of this great manufacturing area, if this amount,—$8,251,755,—were in silver dollars piled one on top of another, the column would be 16 miles high. Also, since the amount expended for new machine equipment in the past twelve months is given as $4,770,590, this amount, if added to the other pile would make its height well over 26 miles. If the total amount expended were in silver dollars placed end to end it would cover 3710 miles, or several hundred miles farther than from New York to San Francisco.

Of the total additions, the passenger car and truck manufacturers are responsible for 6,144,044 sq. ft., costing about $4,496,650 and for new equipment worth $1,413,600, the total spent of which records are available being $5,892,250. Car makers added 5,645,840 sq. ft., at an outlay of $4,299,350 and new fittings worth $1,360,100, the total expense being $5,659,450.

Tire makers made big increases of space, the total being 2,053,160. Increase of equipment by gear makers cost $1,140,000, and correspondingly large amounts were expended in other branches of the industry.

Car Plants Add 11,142,508 Sq. Ft.

Of sixty-one companies manufacturing passenger cars and representing the leading producers, thirty-one have made additions to their factories, ranging from 15,000 to nearly 2,000,000 sq. ft., and five have occupied or arranged to move into entirely new factories during the past year. The cost of these additions averages from $4,500 to almost $2,000,000.

Nearly all these concerns have expended considerable sums for increased factory equipment, varying between $1,500 and nearly $700,000. Four of the largest companies which are working on broad schemes of factory expansion, the plans for which have already been announced. To give an idea of some of the building activity which has characterized the past twelve months in the automobile manufacturing field, we may cite some of the leading firms that have made extensive additions.

Willys-Overland has added 1,765,840 sq. ft. and has announced plans for increasing its working force by the addition of 10,000 men in the near future. Packard has carried out its plan of quantity production and concentration on the new twin-six, increasing its available manufacturing space 742,000 sq. ft., at a cost of $706,350. Reo has added 435,600 ft. and Dodge 416,000, including a new office building. This has been a big year for Franklin, three new buildings having been constructed containing 275,000 sq. ft. costing approximately $500,000. Hudson additions of 201,600 sq. ft. cost approximately $1,000,000 and the company has expended $500,000 for new equipment.

Metz has had a good year, expansion of its factory to the extent of 160,000 sq. ft. being required, the cost of the facilities thus provided being about $300,000. Briscoe added 150,000 sq. ft. to its plant and in addition has purchased the plant of the Lewis Spring & Axle Co., as well as securing still greater facilities by merging the Argo concern and the Jackson Motor Parts Co. The Lewis Spring & Axle Co. has secured the plant formerly occupied by the Flanders interest at Chelsea, Mich. Haynes secured increased space to the extent of 150,000 sq. ft. at a cost of $90,000, new equipment totalling $150,000 for the year.

Studebaker added over 150,000 sq. ft. and plans for expansion are under way requiring the outlay of approximately $1,000,000.

Maxwell increased its plant by 45,000 sq. ft., the additional space being secured at a cost of $55,000, but the company has spent no less than $373,000 on new equipment. Marmon expanded its factory to the extent of 37,500 sq. ft., the new equipment totalling $35,000.

Of the companies occupying new factories or arranging to do so during the past year, the most recent is the new Premier organization which has purchased the Laycock plant in Indianapolis, valued at $1,000,000; this comprising a main building 300 by 900 ft., a three-story structure 70 by 137 and a modern power plant. Empire's new factory gives the company 140,000 ft. of manufacturing space.

The adoption and development of the assembly plant system, which has been used to great advantage by Ford has been more marked during the past year than ever before. Ford has planned an assembly plant for Oklahoma City to contain 180,000 sq. ft. and to cost $500,000, and another for Washington, D. C. to contain 137,790 sq. ft. and to cost $400,000. The company has also bought an 80-acre tract of land near Newark and is said to be planning the construction of a large Eastern plant. Another land purchase by Ford was in Detroit, the object being reported as either the enlargement or the embellishment of the main factory. Two other companies who are building assembly plants are Chevrolet and Overland. Some of the cities chosen as sites by one or the other of these companies being New York, St. Louis, St. Paul, Kansas City and Dallas.

Truck Makers Add 498,204 Sq. Ft.

Thirteen representative truck manufacturing concerns have made additions to their factories during the year and twelve have made extensive purchases of new equipment. Three have occupied or are building new factories. Reo leads in expansion, having added 166,750 sq. ft. and Republic has increased its facilities by 92,300 ft. at an outlay of $50,000, and has also expended $10,000 on new equipment. Harwood-

(*Continued on page* 1139)

A Summary of the Principal Factory Additions

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The Cost and the Value of Equipment Added by the Industry in 1915

PASSENGER CARS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Willys-Overland Co.	1,765,840	....	....	....
Packard	742.000	$706,350	....	$706,350
Reo	435.600	....	....	....
Dodge	416,000	....	....	....
Franklin	275,000	500,000	....	500,000
Hudson	201.600	1,000.000	$500,000	1,500,000
Metz	160,000	300,000	....	300,000
Briscoe	150,000	....	....	....
Lewis Spring & Axle Co.	150,000	90,000	150,000	240,000
Studebaker	150,000	1,000,000	....	1,000,000
Empire	140.000	....	....	....
Kissel	100,000	75,000	50,000	125,000
National	95,000	125,000	12,500	137,500
Hupmobile	90.000	....	200,000	200,000
Paige	90,000	275,000	....	275,000
White	89,000	....	....	....
Detroiter	86,000	....	....	....
King	70,000	....	....	....
Chalmers	69,600	125,000	....	125,000
Moore	67.200	....	....	....
Maxwell	45,000	55,000	373,000	428,000
Marmon	37.500	....	35,000	35,000
Crow	37,500	18,000	8,300	26,300
Moon	36.000	....	....	....
Interstate	36.000	....	....	....
Pierce-Arrow	25,000	....	....	....
Saxon	25.000	10,000	1,500	11,500
Mercer	24,000	20,000	20,000	40,000
Pathfinder	24,000	....	....	....
Dispatch	10,000	....	....	....
Madison	3,000	....	....	....
Stutz	....	....	3,500	3,500
Dort	....	....	3,200	3,200
Pilot	....	....	3,100	3,100
Total	5,645,840	$4,299,350	$1,360,100	$5,659,450

COMMERCIAL VEHICLES

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Reo Motor Car Co.	166,750	....	....	....
Republic Motor Truck Co.	92,300	$50,000	$10,000	$60,000
Harwood-Barley Mfg. Co.	59.879	....	20,000	20,000
Sterling Motor Truck Co.	36,500	35,000	....	35,000
Commerce Motor Car Co.	30,000	35,000	....	35,000
Gramm-Bernstein Co.	30,000	30,000	15,000	45,000
"Old Reliable" Motor Truck Co.	32,000	....	10,000	10,000
Duplex Power Car Co.	12,500	10,000	10,000	20,000
Columbia Motor Truck & Trailer Co.	12,000	10,000	2,000	12,000
Mogul Motor Truck Co.	10.275	23,500	1,500	25,000
Available Truck Co.	8,000	....	1,000	1,000
Morris Motor Truck Co.	5,000	1,800	500	2,300
Hahn Motor Truck & Wagon Co.	3,000	2,000	500	2,500
Total	498,204	$197,300	$70,500	$267,800

AXLES

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Timken-Detroit Axle Co.	200,000	$1,125,000	....	$1,125,000
Walker-Weiss Axle Co.	135,000	50,000	$30,000	80,000
Torbenson-Columbia Axle Co.	40,000	100,000	....	100,000
Russel Motor Axle Co.	11,000	....	....	....
Peru Auto Parts Mfg. Co.	10,000	6,000	15,000	21,000
Jacobson Machine Mfg. Co.	2.800	3,000	5,000	8,000
Western Spring & Axle Co.	25,000	....	....	....
Detroit Axle Co.	....	....	5,000	5,000
Total	423,800	$1,284,000	$55,000	$1,339,000

STARTERS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
The Leece-Neville Co.	100,000	$125,000	$35,000	$160,000
Connecticut Tel. & Elec. Co.	40,000	50,000	25,000	75,000
Bijur	5,000	....	63,000	63,000
Total	145,000	175,000	123,000	298,000

MOTORS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Continental Motor Mfg. Co.	300,000	$200,000	$300,000	$500,000
Rutenber Motor Co.	46,560	27,355	73,115	100,470
Waukesha Motor Co.	40,000	39,000	35,000	74,000
Total	386,560	$266,355.	$408,115	$674,470

TIRES

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
B. F. Goodrich Co.	860,000	....	....	....
Firestone Tire Co.	435,600	....	....	....
Fisk Rubber Co.	348,480	....	....	....
Miller Rubber Co.	130,680	....	....	....
Continental Rubber Works	85,000	$130,000	....	$130,000
Federal Rubber Mfg. Co.	50,000	....	....	....
Braender Rubber & Tire Co.	67,200	80,000	$30,000	110,000
Mohawk Rubber Co.	65,000	100,000	45,000	145,000
Swinehart Tire & Rubber Co.	7,200	30,000	30,000	60,000
Gordon Tire & Rubber Co.	3,000	2,500	15,000	17,500
Ajax-Grieb Rubber Co.	1,000	....	....	....
Total	2,053,160	$342,500	$120,000	$462,500

GEARS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Brown-Lipe Gear Co.	80,000	$120,000	$500,000	$620,000
New Process Gear Corp.	140,000	....	240,000	240,000
Warner Mfg. Co.	....	....	200,000	200,000
T. W. Warner Co.	....	....	100,000	100,000
Covert Motor Veh. Co.	17,500	35,000	10,000	45,000
Gemmer Mfg. Co.	30,000	....	....	....
Detroit Gear & Mach. Co.	12,000	30,000	90,000	120,000
Total	279,500	$185,000	$1,140,000	$1,415,000

SPRINGS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Perfection Spring Co.	54,525	$110,000	$109,000	$219,000
Hess Spring & Axle Co.	45,000	60,000	5,000	65,000
Tuthill Spring Co.	....	....	2,700	2,700
Total	99,525	$170,000	$116,700	$286,700

MAGNETOS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Remy Elec. Co.	....	$60,000	$100,000	$160,000
Bosch Magneto Co.	60,000	125,000	50,000	175,000
Splitdorf Electrical Co.	100,000	....	....	....
Simms Magneto Co.	9,420	15,000	100,000	115,000
Eisemann Magneto Co.	30,000	....	40,000	40,000
Total	199,420	$200,000	$290,000	$490,000

CARBURETERS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Findeisen & Kropf Mfg. Co.	12,000	$30,000	$25,000	$55,000
Byrne-Kingston & Co.	12,123	4,500	5,000	9,500
Breeze Carbureter Co.	6,000	15,750	12,000	27,750
Holtzer-Cabot Co.	150,000	....	....	....
Master Carbureter Corp.	26,624	50,000	35,000	85,000
Total	206,747	$100,250	$77,000	$177,250

CASTINGS

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Aluminum Castings Co.	50,000	$50,000	$50,000	$100,000
Gen. Aluminum & Brass Mfg. Co.	50,000	40,000	60,000	100,000
Harley Co.	30.000	50,000	....	50.000
Nat'l Bronze & Alum. Co.	15.000	15,000	....	15,000
Atlas Brass & Fdry. Co.	3,360	4,500	1.500	6,000
American Bronze Co.	25,000	....	10,000	10.000
Indianapolis Brass Co.	....	....	7,500	7,500
Pioneer Brass Works.	....	....	2,500	2,500
Ohio Forge	....	....	30.000	30.000
Jackson Motor Shaft Co.	3,000	3,000	15,000	18,000
Total	176,360	$162,500	$176,500	$339,000

ACCESSORIES

Company	Space Added Sq. Ft.	Cost of Additions	Added Equipment	Total Cost
Auto Body Co.	50,000	$30,000	$50.000	$80,000
Lally Commercial Body Co.	8,000	10.000	15,000	25,000
Fuller & Sons Mfg. Co.	26,320	30,000	15,000	45,000
Fedders Mfg. Co.	110.000	100,000	60,000	160,000
McCord Mfg. Co.	106,500	....	....	....
Salisbury Wheel & Mfg. Co.	30,000	25,000	115,000	140,000
Stewart-Warner Speedom. Corp.	275,000	....	....	....
Van Sicklen Speedom. Corp.	48,000	80,000	....	80.000
Champion Spark Plug Co.	....	....	160,000	160,000
Champion Ignition Co.	12,172	20,000	29.800	49,800
Gibson-Hollister Co.	....	7,500	8,375	15,875
Pittsfield Spark Coil Co.	12,000	....	....	....
J. H. Sager Co.	8,000	....	....	....
Duff Mfg. Co.	16,000	35,000	25,000	60,000
Gleason-Peters Air Pump Co.	4,000	10,000	15,000	25,000
Advance Machine Co.	....	....	5,000	5,000
Burd High Compression Ring Co.	25.000	40.000	35,000	75,000
Piston Ring Co.	6,500	8,000	13,000	21,000
Houpert Machine Co.	6,000	....	25,000	25,000
W. W. Wainwright & Sons	2,400	2,000	6,000	8,000
Prest-O-Lite Co.	45,000	60,000	25,000	85,000
Essex Storage Battery Co.	500	2,000	1,500	3,500
Standard Woven Fabric Co.	200,000	300,000	150,000	450,000
Royal Equipment Co.	35,000	110,000	50,000	160,000
Universal Machine Co.	2,000	....	20,000	30,000
Total	1,028,392	$869,500	$833,675	$1,703,175
Grand total	11,142,508	$8,251,755	$4,770,590	$12,886,345

Automobile Chronology for 1915

Industrial—Financial—Registrations—Miscellaneous

Industrial

January

1—Dort Co., Flint, Mich. incorporates for $500,000.
2—Pratt & Whitney buys Pope main works in Hartford, Conn., for $300,000.
6—Consolidated Car Co. buys Abbott for $500,000.
7—Used car reports of Chicago Automobile Trade Assn. nationalized.
11—Stevens-Duryea stops manufacturing. Plant taken over by Westinghouse.
11—Packard announces six worm-drive trucks.
12—Goodyear to take over Motz tire sales Feb. 1.
13—Ross & Young Machine Co., Detroit, to make eight-cylinder Ross car.
18—Willys sells Gramm and Garford interests.

February

1—Tire makers cut tire prices about 25 per cent.
3—Briscoe leases Cutting factory.
15—American Steel Foundries, Chicago, enter automobile field.
22—King gives employees 7½ per cent salary bonus.
23—Detroit Starter Co. builds Ward Leonard system starter.
26—Delion Tire & Rubber Co. opens Trenton plant.
27—Gasoline down to 10½ cents in Milwaukee.

March

4—Marion Motor Car Co. moves to Jackson, Mich.
6—Timken-Detroit Axle Co. buys Metal Product plant in Detroit.
10—Garford Motor Truck Co., Lima, Ohio, starts work.
13—Massnick-Phipps, Perkins motor maker, gets Wahl Motor Co. plant in Detroit.
19—Champion Spark Plug inaugurates profit-sharing plan.
22—Chevrolet buys second Tarrytown plant.
25—New Ford four-story assembly plant in Indianapolis.
29—Houk company buys American Spoke Co. plant in Detroit.

April

2—Ford buys 56.7 acres of land opposite Highland Park plant.
5—National Gauge & Equipment replaces Hans Motor Equipment Co.
22—Standard Steel Car Co., Butler, Pa., to build eight-cylinder cars.
26—Master Carbureter buys Air Compressor plant in Detroit.

May

1—Somerville Special Agency, Detroit, to make starter. First starters for Ford cars.
3—Kelly-Springfield Tire to share profits over $1,000,000.
6—Speedwell plant sold for $150,000 at receivers' sale to W. M. Pattison Supply Co. Assets sold to Puritan Machine Co.
13—Stevens-Duryea plants purchased by Westinghouse for $1,000,000.
14—Columbus Buggy assets sold—to supply parts.
15—J. W. Lyons disposes of Lyons-Atlas interests.
17—Monarch Motor Car Co. reorganized.
20—Leece-Neville buys a two- and three-story plant in Cleveland.
25—Lozier's Plattsburg plant sold for $200,000.

June

1—Ford reduces prices on parts from 10 to 25 per cent.
1—S. G. V. plant in Reading, Pa., sold for $55,600. Parts moved to Newark, N. J.
1—Winton changes name to Winton Co.
4—Colby plant in Mason City, Iowa, sold for $32,800 at receiver's sale.
4—U. S. L. reorganizes. United States Light & Heat Co. of New York formed with $8,000,000 capital.
5—Prest-O-Lite buys Pumpelly battery plant and enters electric lighting and battery field.
7—Baker and Rauch & Lang unite as Baker R. & L. Co. Capital increased from $1,000,000 to $2,500,000.
9—Torbenson Gear Co., Newark, N. J., buys Cleveland plant.
11—Fisher Body buys Universal truck plant for $120,000.
12—P. R. Mfg. Co., Detroit, buys Zephyr carbureter rights.
16—White gives 8-hr. day to 3800 men. Wages increased.
19—Bell Motor Car Co., York, Pa., plant starts production.
19—Knox Motors Associates formed to take care of sales and advertising of Knox products.
25—Overland raises wages 5 per cent.
28—Keeton plant sold for $45,000.

July

2—Tires may be shipped by parcels post.
3—Gasoline prices in Southwest unsettled. Costs 11 to 20 cents a gal. in Western Texas.
6—Michigan Buggy plant sold to States Motor Car Co., Toledo, for $60,000.
6—Studebaker insures employees.
7—Elgin National Watch to make Van speedometer.
7—Simplex takes over Crane Co. Will build Crane-Simplex 6 and 4.
10—Sternberg Truck changes name to Sterling.
12—Eight new Ford branches established, totaling forty-three with twenty-six assembling plants.
17—Briggs-Detroiter to continue. Detroiter Motor Car Co. formed.
17—Marion and Imperial to be marketed by Mutual Motors Co., Jackson, Mich.
19—National Rubber to move plant from Pottstown to Williamsburg, Pa.
19—Prest-O-Lite to make steel parts.
21—Pope's Westfield plant sold for $725,000.
28—Ford reduces car price $50.
31—Locomobile will share profits with workmen.
31—Autocar men given 10 per cent increase in wages.

August

2—Denby buys Briggs plant for $63,500.
2—International Motors raises wages 20 per cent.
6—Chevrolet takes over Mason stock. Twenty more acres added to Mason plant.
7—Vacuum Oil raises wages about 10 per cent.
11—Lyons-Atlas discontinues cars.
14—Hercules Motor Car Co. plant bid in for $20,800 at sheriff's sale.
16—100 Chalmers service men in annual convention at factory.
17—New Process Gear buys Monarch Typewriter plant.
21—Case has pension system.
30—Heinze Co. enters starter field with plant in Springfield, Ohio.
31—Walker Co. to sell electrics without batteries.

September

1—Hurlburt leases Mott Iron Works in New York City.
6—Miller Rubber starts free tire service.
8—15,141 carloads of automobiles shipped in August, against 8352 in 1914.
8—New York gasoline reaches 20 cents a gal., an advance of 4 cents in 4 weeks.
9—Packard grants bonus to employees in military system.
14—Prest-O-Lite buys Brown battery. Also purchases four special Maxwell racing cars.
20—Studebaker school for employees. Three-year commercial, mechanical and technical course with savings.

October

1—Champion Spark Plug Co. increases production from 35,000 to 50,000 spark plugs a day.
1—Chevrolet Motor Co. of Delaware formed, with capital of $20,000,000; 200,000 cars for 1917.
2—Canadian car sales gain 50 per cent; 7000 more cars sold than during 1914.
2—Post office contracts awarded for trucks. Ford, G. M. C., Buick, Kelly-Springfield, White and Packard get orders.
7—England imposes a 33⅓ per cent duty on cars and parts.
9—Norma Bearings now made in America.
11—1,006,835 Ford cars built up to Oct. 1.
12—Delco 1915 output will be 125,000 systems.
15—Stearns gives 10-hr. pay for 8-hr. work.
16—Goodrich to insure and pension employees.

November

1—Chevrolet cars to be assembled in McLaughlin carriage plant in Oshawa, Canada.
1—New York State automobile and accessory plants have 15,485 employees, twenty-six automobile and parts makers. Wages increased 10 per cent in September.
1—$1,000,000 building for Touraine Motor Co., Philadelphia. Company will lease six-story building.
3—Moline Plow Co., Moline, Ill., will continue making buggies as well as automobiles.
3—Peerless and General Vehicle companies sold. Peerless Truck & Motor Corp. formed to take over both.
4—De Tamble Motors plant equipment sold for taxes. Plant idle for 2 or 3 years.
5—October shipments consist of 15,972 carloads against 10,443 in 1914.
6—Acceptance Corp., New York City, will buy notes taken by truck dealers.
6—Mercer machinists receive 50-hr. week in place of 54-hr.
6—Argo Motor Co., Jackson, Mich., buys Standard Electric plant, which it has been occupying.
8—Guaranty Securities Co., Toledo, formed to finance time payments on Overland cars. Three kinds of discount facilities—special plan for farmers.
10—Walker-Weiss Axle Co., Flint, buys H. J. Martin forging plant in Indianapolis.
11—Yale & Towne Co., Stamford, Conn., increases wages 10 per cent.
12—Studebaker to build branches in Portland and Dallas.
15—Sun Motor Car Co., Buffalo, buys Sterling Motor plant in Elkhart, Ind.
15—Touraine Co., Philadelphia changes name to Vim Motor Truck Co. to make Vim delivery car.
16—Disco Electric Starter Corp. takes over company. New capital $250,000.
19—Chevrolet assembly plant for Dallas to cost $250,000.
20—Ford tractor to be made by Henry Ford & Son, Dearborn, Mich.
20—Parry Mfg. Co., Indianapolis, to build commercial bodies, tops and trailers.
20—Springfield Body Co. takes over business of Springfield Metal Body Co. Capital is $1,000,000. To operate plant in Detroit as well as in Springfield.
22—Hupp Motor Car Co. buys American gear plant in Jackson to use for making axles.
22—Sun Motor Car Co., Buffalo, moves to Elkhart, Ind., to plant formerly occupied by Sterling Motor Car Co.
23—Lavine Gear Co., Racine, is new name of Lavigne Co., reorganized and capacity to be doubled.
23—Standard Woven Fabric Co., Framingham, Mass., Multibestos maker buys former Walpole tire plant.
24—Hupp Motor Car Corp. chartered in Virginia with capital of $8,000,000.
25—Anderson Rolled-Gear plant taken over by Shaw-Kendall Engineering Co., Toledo, to make gears.
25—New Billings & Spencer Co. formed in Hartford.
26—Canadian Ford melon, 600 per cent dividend—capital increased from $1,000,000 to $10,000,000.
26—Ford plans Eastern plant. Buys 80-acre tract near Newark—begins work on three more Ford assembly plants in Milwaukee, Omaha and Oklahoma City.
26—Fostoria Light Car Co. takes over Storm Buggy Co.
30—General Electric buys interest in Owen Co. Entz Motor Patents Corp. is formed to control Entz electric patents.
30—Premier plant sold to syndicate for $125,000. To continue manufacture of Premier cars.
30—Two land deals in Cleveland. Baker R. & L. Co. to build new plant. Rollin White plans a tractor plant in Euclid.
30—U. S. Government proposes to raise a part of its extra revenue of $112,000,000 by placing tax of 1 cent a gal. on gasoline used, and also a tax on motor vehicles, according to horsepower.

December

1—Grinnell Electric Car Co., Detroit, discontinues manufacture of Grinnell electric.
2—Reliance Engineering Co., Lansing, takes over Seager Engine Works. Machinery of Reliance company moved to Seager plant, whose assets are estimated at $1,500,000.
3—Standard Truck Co. enters small truck field with 2-tonner selling at $2,000.
4—Niles Car & Mfg. Co., Niles, Ohio, manufacturer of interurban cars, will build trucks. Will turn out general delivery type.
4—Sparks-Withington buys Cleveland Radiator Co. plant, equipment and commercial good will. Equipment will be moved to old Sparks-Withington plant in Jackson where the manufacture of honeycomb radiators will be started.
4—Burd High Compression Ring Co., Rockford, Ill., moved into its new plant, capable of turning out 25,000 piston rings per day and employing 250 men.
4—Western Tire & Rubber Co., Kansas City, moves to Akron, where it is incorporated under name of General Tire & Rubber Co. with capital of $200,000.
7—Packard to build 12,000 cars in 1916, an increase of 4500 or 60 per cent over 1915.
7—Moline Plow Co., Columbus, buys manufacturing rights of Universal Cultiplow, produced by the Universal Tractor Mfg. Co., which discontinues.
8—Puritan Machine buys Cartercar parts business.
8—Briscoe and Argo buy Jackson Motor Parts Co. Machinery which was in plant formerly occupied by defunct Mason Motor Co., also has been bought and is now in Jackson plant.

Financial

January

1—Reo profits in 1914, $2,539,187. Built 13,516 cars.
5—Hood Rubber common increased $1,000,000.
9—Hudson sales for 5 months, $7,500,000.
23—Federal Rubber capital increased $1,000,000.
29—Republic Rubber approves $3,000,000 issue on preferred.
29—Goodrich 1914 profits $5,440,000.
29—Fisk 1914 profits $942,204.

February

3—Rolls-Royce profits $384,255, decrease of $71,500.
6—Gray & Davis 1914 sales amount to $4,000,000.
9—Republic truck dividend of 100 per cent.
9—Kelly-Springfield tire profits $1,215,143, gain of $939,194.
12—Fisk adds $500,000 preferred.
15—National Carbon's 1914 income $2,215,880.
23—Stewart-Warner earns 10 per cent on common.
24—Goodrich 1914 net sales $41,764,008.
25—Studebaker profits $4,441,966, a gain of 150.6 per cent.

March

5—U. S. Rubber's net profits $9,776,873.
5—Ford dividend of $48,000,000. Capital increased from $2,000,000 to $100,000,000. Henry Ford's profits $27,840,000.
7—Baker R. & L. capital increased from $1,000,000 to $2,500,000.
10—Goodrich reduces preferred $2,000,000.
13—Lozier gets $5,000,000 new capital.

April

1—Overland surplus for 6 months $2,853,864.
28—Ford to pay over $15,000,000 in rebates to car owners.

May

8—Packard's April sales $3,047,811.

June

16—Reo extra dividend of 12.5 per cent, a total of $450,000.

July

1—Chandler dividend of 77 1-2 per cent on common, making a total of 100 per cent on issue in 1 year.
3—U. S. Tire passes quarterly dividend of 1 1-2 per cent on common.
28—Goodrich 1915 profits $4,000,000. First 6 months show $1,348,922 gain.

August

3—Paige increases capital $750,000.
16—White increases stock $3,000,000 to pay 7 per cent. Former stock amounted to $500,000 preferred and $2,440,000 common. Preferred to be retired immediately at $115 per share plus accumulated dividends.
16—Haynes 100 per cent stock dividend. Capital increased from $600,000 to $1,200,000.

September

1—Firestone declares 4 per cent extra dividend, amounting to 16 per cent for the year. Net profits for year are $4,343,000, a gain of $2,800,000. Sales are $25,187,884, an increase of $5,937,774. Production is 7500 pneumatic tires and 1100 solids a day.
8—Reo pays extra dividend of 12 1-2 per cent.
9—Morton truck capital increased from $100,000 to $1,000,000.
14—Packards built in year number 4908, valued at $15,553,650.
18—General Motors declares 50 per cent dividend. Earned $4,926,322. Seventeen directors on new board.

October

1—Chevrolet capital increased from $2,500,000 to $20,000,000. Now Chevrolet Motor Co. of Del.
1—Hayes Wheel increases capital from $300,000 to $1,000,000. Stock dividend of 166 per cent of $500,000 to be declared.
4—G. M. voting trust dissolved.
4—Swinehart Tire earns 16 per cent on $800,000 stock. Gross earnings exceed $2,000,000 and net earnings pass $135,000.
8—Chevrolet Motor Co. of Mich. now. Current earnings at rate of $2,500,000 per annum or 12 1-2 per cent on stock.
9—Chalmers common listed on New York curb.
11—Perfection Spring raises capital from $1,500,000 to $2,500,000.
11—Disco raises capital from $40,000 to $100,000.
14—Ford surplus gains $10,308,738.59 in 10 months. $43,788,151.23 cash on hand, an increase of $16,346,682.44 over 1914. Total assets $88,535,840.41, an increase on $26,903,583.25 over 1914.
20—Continental Motor Mfg. Co., Detroit, declares 100 per cent dividend. Increases capital $500,000 to $2,900,000. Surplus of $1,200,000 or $500,000 more than 1914.
22—Packard surplus $3,713,747.22. Gains $1,915,926.80. Assets $21,814,153.71. 29,936 cars and trucks built.
23—Gray & Davis increases capital from $1,750,000 to $2,000,000.
26—Canadian Ford capital increased from $1,000,000 to $10,000,000. Dividend of 600 per cent.

November

1—Chandler stock increased from $425,000 to $10,000,000.
1—Maxwell to aid dealers' finances by using part of its surplus in deposits in different parts of country where its dealers are and enable latter to get loans from banks.
1—Studebaker to retire all serial notes amounting to $2,300,000. Company has no debts except current accounts. Working capital will be $22,050,000.
1—H. W. Ford, president of Saxon Motor Co. buys Hugh Chalmers stock and passes into control of company. $500,000 involved. Company will build 28,600 cars.
1—Canadian Ford profits $3,202,458.15. Gain of $1,179,962.09 over 1914. Cash on hand $2,609,997.65.
1—$3,000,000 company to build Lozier cars. Property bought by Associated Lozier Purchasers. Theodore Friedeberg elected president. Will keep property.
4—Chalmers common stock to pay $12 a share starting Jan. 1.
4—Continental Motor Mfg. Co., dividend of $416,000. Company increases capital $2,400,000 to $2,900,000.
5—Goodyear gross business to Oct. 31 totals $36,000,000, or $5,000,000 better than 1914. Over 2,000,000 tires made.
9—Peerless Truck & Motor Corp. earns 19 per cent on new $10,000,000 stock. Based on actual shipments of Peerless Motor Car Co. and General Vehicle Co. for calendar year.
10—Maxwell stockholders approve plan for paying back dividends.
13—Reo 10-months' surplus $3,661,802.20 or $1,969,720.20 over 1914—$2,390,951.60 cash on hand and in banks. Reo Truck assets gain $231,510.09 in 10 months.
13—Hyatt capital increased from $400,000 to $6,000,000 for plant enlargement.
13—United States & Heating Corp. gets working capital of $500,000 through sale of 50,000 shares of treasury stock.
16—Fifth Avenue Coach Co., New York City, earns $1,451,508.10 in year. Carries 14,050,471 passengers in 133 buses during year.
19—Hupp increases capital from $1,000,000 to $6,500,000, divided into $5,000,000 common stock and $1,500,000 preferred.
20—Saxon Motor Car Corp. succeeds company and increases capital from $350,000 to $6,000,000 common.
20—Autocar doubles capital to $2,000,000.
25—Simplex Automobile capital increased from $1,500,000 to $5,000,000.
30—Consolidated Car Co. capital increased from $250,000 to $500,000.
30—Kelly-Springfield Tire reduces common par value from $100 to $25.

December

4—Franklin to increase common to $2,000,000 from $900,000. Preferred stock, amounting to $600,000 is all in treasury of company.
4—Commerce Motor Car Co., Detroit, to increase capital from $100,000 to $200,000.
4—Denby Motor Truck Co. to increase stock from $250,000 to $750,000, of which $500,000 will be common and the balance preferred.
7—Goodyear earns 55 1-2 per cent on common. Sales amount to $36,490,652 and net income is $5,137,082. Assets are $14,500,000.

Registration

January

9—New York registrations 169,966 in 1914.

February

2—Canada has 61,599 car owners in 1914.
13—15,000 Pennsylvania farmers own cars.
15—Iowa has 106,087 cars in 1914.
15—Kentucky registrations number 20,000, an increase of 64 per cent.

March

1—New England gains 48,063 cars in 2 years; 142,497 cars and trucks in 1914, or 52 people per car.
25—United States has 1,754,570 cars in 1914, showing a gain of 500,695 over 1913. Increase of 1,077,570 in 4 years.

April

3—37,990 Michigan licenses in 2 months.
3—120,296 cars and trucks in Ohio.
8—Ontario has 34,000 cars.
17—New York State has 168,598 cars; 50,000 cars ahead of 1914.
21—California registration is 131,123.

June

11—144,750 cars and 1400 dealers in Ohio.
14—66,745 cars in Wisconsin, the 1914 registration being 53,161.

July

3—Canada has 77,339 cars, divided into 1155 trucks and 68,320 cars, with 1120 dealers.
15—Colorado has 21,826 cars and trucks, an increase of 5000.
17—Massachusetts registration is 83,868 cars and trucks, a gain of 27.5 per cent over 1914.
23—Oklahoma has 32,000 cars.

August

12—United States has 2,070,903 cars. Registrations for the first 6 months of 1915 show gain of 334,809. Output of 625,000 cars predicted.

September

14—New York State has 212,882 cars; 168,000 in Ohio; 166,886 in Illinois; 151,523 in Pennsylvania, and 150,232 in California.
16—Michigan registrations during the first 6 months are 91,683 cars and 2499 trucks. A gain of 20,000 over 1914 total.

October

2—Iowa has 140,168 cars; 36,000 more than 1914. Farmers big factor in 33 per cent gain.
8—Kansas has 2487 tractors.
8—Wisconsin has 78,169 cars, a gain of 25,008 over 1914 total.
9—Ohio has 176,428 cars. Nearly 50 per cent better than 1914 total.
9—New York State has 222,025 owners; 164,438 in 1914 up to Oct. 1; 1914 total was 170,171.
9—Iowa has 150,000 cars; 50,000 cars bought in 1 year. Cars average $800 to $900 in value.

November

1—Rhode Island has 14,017 cars. Fords number 4413 and Cadillacs 1070.
6—New York State has 227,467 cars; 57,296 more owners and dealers than in 1914. Chauffeurs number 77,675.

13—Iowa 3-year license law in force Jan. 1. Machines registered 4 years will be registered for ½ regular fee.
20—Wisconsin has 79,759 cars, as against 53,161 in whole year of 1914; 26,600 new cars bought in 1915.

December

8—New York State up to Dec. 4 has 231,713 registrations, divided into 171,698 cars and 22,949 trucks. Dealers number 2194.

Miscellaneous

January

2—1200 London buses commandeered.

February

26—Germany cuts private car use 50 per cent to save in consumption of gasoline, rubber and oil.

March

6—London buses carry 734,000,000 in 1913.
6—Motor buses stopped in Berlin.

April

15—341,250 motor vehicles in United Kingdom.
15—New South Wales has 10,001 cars in 1914.
20—Italy to take over automobile plants.
26—War rushes French plants.
18—$4,467,453 for Paris Bus Co. from the French war department to compensate for vehicles requisitioned. No buses in Paris.

July

1—$108,191,774 for roads in 1914. Over 6000 miles of new roads added and over 35,500 improved during year 1914 in thirty-five States.
17—Only passenger cars allowed in Yellowstone Park. $5 fee for runabouts—$7.50 for five and $10 for seven-passenger cars.
24—France orders machinery declared.
26—Blue Book to add a volume. Will cover territory below Potomac and Ohio rivers—New index maps.
27—Lincoln highway route changed. Washington and Baltimore to be included.

August

1—Yellowstone Park opened to tourists.
6—Britons would protect motor trade by high duty.
8—English Ford sells 12,500 cars. War has not affected English business. Fifty per cent increase.
7—French car owners must pay taxes despite war.
28—Michelin French plant rushed. Produces 6000 tires a day.
28—$49,000,000 for rural delivery by U. S. post office department. $2,000,000 saving effected.

September

3—Cut accidents 54 per cent at Ford plant by teaching of English to workers.
18—Post office department authorizes 500 automobile rural routes. Cost per mile for automobile is $0.034.

October

1—Great Britain imposes 33 1/3 per cent import duty on automobiles and parts.
7—France to fix price of alcohol. Denatured product becomes government monopoly on Jan. 1, 1917.
9—Austria confiscates all tires.
9—Gasoline shortage in Paris. Fuel famine for first time since war began—Price, 42 cents.
11—Blaze Dixie highway trail. First official inspection tour from Chicago to Florida.
16—Spain has 10,548 cars, or one car to every 1896 persons.

November

1—Gasoline shortage in Paris threatens to stop taxicabs.
6—Community garage developed in Jackson County, Wis. Promoters to sell one share only to each automobile owner. Will provide service.
13—American motorists given 10 days to tour in Canada free by Customs Department at Ottawa.
30—Setback for U. S. cars in France. Agency negotiations affected by 33 to 45 per cent duty to be imposed.

RUBBER

January

1—Rubber imports from Para from Nov. 28 to Dec. 22 amounts 4,876,000 lb.
11—Great Britain agrees to permit rubber exports to U. S. from London via the British Consul General in New York.
23—Lusitania arrives with 200 tons of rubber with 1000 more on Menominee.

February

16—Rubber control committee appointed to handle situation in regard to certain agreements in the shipment of rubber from England to the United States.

March

1—Rubber imports from England in 1 month amounts to 4,859,200 lb.
13—Process for making synthetic rubber from crude oil discovered.
18—Rubber substitute made of coal tar, which is the chief ingredient.

July

27—No tires on cars for export to neutral countries.

August

27—South America ships 3,008,114 lb. rubber to the United States during the year, as against 1,035,396 in 1914.

October

6—Great Britain taxes 2 3/8 cents a pound on Ceylon rubber shipments from London to the United States.
23—142,000 tons of rubber predicted for 1915. United States to use 75,000.

November

6—No tire shortage in England. Manager of Goodyear Co. of Great Britain states business is tranquil.

1915—A Record Year for Speedways

(*Continued from page* 1133)

by Anderson in a Stutz with Cooper in a Stutz second. The winner averaged 77.256 m.p.h., as against 73.53 m.p.h. in 1914. The C. A. C. trophy, held the previous day, went to Cooper, with Anderson second, the winner's average being 74.979 m.p.h. as against 73.90 m.p.h. in 1914.

Two companies, prominent in the 1914 season as backers of racing teams, withdrew from racing in 1915. Stutz announced its indefinite withdrawal after the Sheepshead Bay speedway race, Oct. 14, and Maxwell, which had seven racers on the tracks up to July, 1915, was the other. Four of its cars were taken over by the Prest-O-Lite Co., which formed a company to race these cars on the speedways.

Racing in 1915 was fortunate in having few serious accidents. Only three deaths occurred at the important race meets and about two at the small track events. Harry Grant died Oct. 8 from burns suffered when his Maxwell took fire in practice. Joe Cooper in a Sebring was killed at the Des Moines speedway Aug. 8. Albert Johnson was killed when a Packard test car at the Indianapolis Speedway turned over from a blowout while going 86 m.p.h. Wm. Carlson was killed at Tacoma.

Fuel efficiency and economy tests in 1915 were gone into extensively by the automobile and accessory manufacturers. Four fuel and economy tests were attended by A. A. A. representatives, and a number of the automobile and accessory companies made unofficial tests with their products.

Under A. A. A. sanction Stromberg held a test Sept. 16 in Chicago with a Buick six which averaged 27.5 m.p.g. and in a speed test 56.2 m.p.h. In an acceleration test the car went from 0 to 30 m.p.h. in 11 1-5 sec. through first, second and third-speed gears. On high alone it accelerated from 5 to 25 m.p.h. in 12 2-5 sec.

Another official test was that of the Packard twin six in July at Chicago speedway when it made 50 miles in an economy run, averaging 13.3 m.p.g. In an acceleration test it went from 5 to 30 m.p.h. in 13.60 sec. and from 5 to 50 m.p.h. in 26.20 sec. In a speed test it went 10 miles at the rate of 72.9 m.p.h.

An Oakland touring car with a Marvel carbureter at Chicago on Jan. 27 made 13.1 m.p.g. in a fuel economy test. A roadster, also equipped with a Marvel carbureter, made 27.3 m.p.g.

A Buick equipped with Edwards carbureter averaged 28.9 m.p.g. and 58 m.p.h.

A number of unofficial tests were made in 1915. A Detroit electric made a 2065-mile run which cost $29. In a fuel economy test 137 Franklins averaged 32.1 m.p.g. An Owen Magnetic averaged 34.1 m.p.h. for 1935 miles in a trip from New York City to Indianapolis, averaging 12.8 m.p.g. A Chandler six completed a non-stop run across the United States, making 1889.5 miles from Mexico to Canada in six days. A Maxwell, driven by Ray McNamara, made Detroit to Indianapolis and return in 20:1. In a Maxwell efficiency run, Miss Eva Cunningham, the winner, drove 567 miles on 17 gal. of gasoline or 33.37 m.p.g. A Franklin in an oil consumption test traveled 1046 miles on 1 gal. and averaged 16.7 m.p.g. for gasoline consumption. E. C. Patterson in a Packard 3-38 touring car covered 1015 miles, Chicago to New York City, in 35:43, or 24.48 m.p.h.

The 1916 racing season will be opened on May 13 at the Sheepshead Bay Speedway. Next year's racing schedule is placed on a more systematic basis. With the exception of two clashing dates on July 4 at Minneapolis and Sioux City, the rest of the dates are arranged so as to fall, in a majority of cases, about two weeks apart. Sixteen dates, in all, have been allotted ten cities. Two spring races are scheduled, one at New York and the other at Indianapolis on May 30. Following these are two for June, one on the 17th at Chicago and the other at Des Moines on the 28th. Then come three for July, two for August, four in September, and two in October, the closing speedway event of the year being at Chicago on the 14th.

Industry Adds 11,142,508 Sq. Ft. in 1915

(*Concluded from page* 1134)

Barley has added 59,879 sq. ft. and has purchased $20,000 worth of new machinery, etc. Sterling has increased its space 36,500 ft. at a cost of $35,000 and Commerce and Gramm have each added 30,000 sq. ft., Gramm at an outlay of $30,000 and Commerce expending $35,000. Gramm also added $15,000 in new equipment during the year.

The three companies occupying or arranging to occupy new plants are: Federal, which will have 140,000 sq. ft. of space available about the first of the year; Vim, which is building a new factory in Philadelphia to contain 487,600 sq. ft. at a cost of $1,000,000; and Ware, which is preparing to occupy a new four-story plant of 200 ft. frontage which cost $51,000.

Expansion by Parts Makers

There has been a great deal of building activity among the axle manufacturers. Timken adding 200,000 sq. ft. at an outlay of $1,125,000; Walker-Weiss, 135,000 sq. ft. costing $50,000, and in addition $30,000 worth of new equipment; and Torbensen 40,000 ft. costing $100,000.

In the bearing field there has been almost unprecedented expansion, largely due to the stoppage of European bearing importation by the war. Nearly all the larger makers have made tremendous expansions, among whom might be mentioned New Departure, Hyatt, Hess-Bright, Timken, Gurney and Fafnir. S. K. F. is preparing to occupy a new plant containing approximately 348,480 ft.

Continental leads the motor manufacturers in expansion made during the past year, adding 300,000 sq. ft. at an outlay of $200,000 and expending $300,000 for new machinery, etc. Rutenber added 46,560 ft. at a cost of $27,355 and bought $73,115 worth of new equipment, while Waukesha increased its facilities 40,000 sq. ft. by the expenditure of $39,000 and added new factory fittings costing $35,000.

Huge Expansions by Tire Companies

A review of the tire field shows that the past year will apparently come close to being a record for the manufacturers, many of them having been forced to make very large expansions of their factory facilities. Goodrich and Goodyear made the largest additions, the total combined space of these running well over 1,000,000 sq. ft., while the cost represented an outlay of somewhere in the neighborhood of $1,500,000 to $2,000,000. Firestone and Fisk added 435,600 and 348,489 sq. ft. respectively, while Miller added 130,680 sq. ft. and Continental 85,000, the latter at an expenditure of $130,000.

The purchase of the Federal company at Milwaukee by the Fisk interests as reported in THE AUTOMOBILE last week will greatly increase the capacity of the organization.

Gear Makers Increase Equipment

The gear manufacturers have made a number of large additions to their factories, but the main feature of factory expansion in this field during the past twelve months was the increase in equipment. For instance Brown-Lipe-Chapin added 80,000 sq. ft. at a cost of $120,000, and purchased new machinery, etc., to the value of $500,000; New Process increased its space 140,000 ft., spending $240,000 on new equipment; Warner Mfg. Co. spent $200,000 for equipment and the T. W. Warner Co. expended $100,000 for the same purpose. Covert spent $10,000 also adding 17,500 sq. ft. to its plant at a cost of $35,000. Gemmer added 30,000 ft. and Detroit 12,000 at an outlay of $30,000, also spending $90,000 for new equipment. Timken-David-Brown is making an addition and purchasing sufficient equipment to enable the plant to quadruple its present production.

The same conditions prevail among the spring manufacturers as in the gear field, though perhaps in a more limited degree, Perfection has added 54,525 sq. ft. at a cost of $110,000 and has bought new equipment worth $109,000; Hess has added 45,000 at an outlay of $60,000 with $5,000 worth of new machinery, etc., and Tuthill has installed new equipment to the extent of $2,700.

Magneto Factories Enlarged

Factory additions have been the rule among the larger companies manufacturing magnetos, Bosch increasing its space 60,000 sq. ft. at an outlay of $125,000, and spending $50,000 for new machinery, etc.; Splitdorf adding 100,000 sq. ft., and purchasing the Sumter concern for $1,000,000; Simms increasing its space 9420 at a cost of $15,000 and expanding $100,000 on new equipment; and Eisemann adding 30,000 sq. ft. and buying machinery, etc., worth $40,000.

Activity in the way of new factory buildings has not been so marked in the carbureter field. Rayfield's addition was 12,000 sq. ft. at a cost of $30,000, with $25,000 worth of new machinery; Kingston's increase was 12,123 ft. costing $4,500 and $5,000 worth of equipment; and Breeze added 6000 ft. at a cost of $15,750, expending $12,000 for new equipment. Holtzer-Cabot has a new factory giving 150,000 sq. ft. of floorspace, while Master's new plant, which cost $50,000, provides 26,624 ft. and new equipment represents $35,000.

Casting and Forging Companies Expand

A number of the casting companies have made additions to their plants and equipment. General Aluminum & Brass Mfg. Co., has added 50,000 sq. ft. at a cost of $40,000, with $60,000 worth of new equipment. Harley added 30,000 sq. ft. at an outlay of $50,000. The Metal Products plant of the Timken-Detroit Axle Co. has made additions to its main plant and heat-treating department and has doubled its output in the past six months. National Bronze & Aluminum Foundry has added 15,000 ft. at a cost of $15,000; Atlas Brass Foundry 3360 ft. at a cost of $4,500 with $1,500 new equipment.

In the Accessory Field

In the radiator field, Fedders has increased his facilities 110,000 sq. ft. at an outlay of $100,000, spending $60,000 more for new equipment. McCord has added 19,500 sq. ft. to the main factory in Detroit and acquired two new factories, one at Wyandotte, Mich., containing 22,000 sq. ft. and to be used for gasket and stamping business and the other, for radiator manufacture, in Detroit and containing 65,000 sq. ft., the total additions for the year being 106,500 ft.

Of the wheel makers Salisbury has increased its plant by 30,000 ft. at an outlay of $25,000, spending $115,000 for equipment, a feature of the additions being the new office building.

Stewart-Warner Speedometer Corp. has added 275,000 ft. while the VanSicklen company has a 48,000-ft. new factory and has spent $80,000 for new equipment.

Of the spark plug makers, Champion Spark Plug Co. of Toledo, has added $160,000 worth of new equipment while the Champion Ignition Co., Flint, Mich., has increased its space by 12,172 ft. at a cost of $20,000 with new equipment worth $29,800. Gibson-Hollister has occupied a new factory 100 by 200 and has made an addition 40 by 100 costing $7,500, new machinery, etc., representing $8,375 being purchased during the year. Pittsfield Spark Coil Co. has occupied a new factory of 12,000 sq. ft.

Two manufacturers of brake lining have made considerable expansion during the past year. The Standard Woven Fabric Co. has occupied its new $300,000 plant containing 200,000 sq. ft. and has purchased new machinery equipment worth $150,000. The Royal Equipment Co. has added 35,000 sq. ft. at a cost of $110,000 and has spent $50,000 for new machinery.

New Marmon Is Unique Car

Remarkable Acceleration Obtained by Light Construction —Aluminum Motor, Special Frame, New Type Springs, Novel Body Construction—A Really Scientific Car

THE year 1915 has been one of new things throughout the whole automobile industry, never before have there been so many interesting new cars announced than during the past twelve months, and of the long list none will rank higher in interest than the new Marmon.

Possessed of years of experience in the manufacture of the largest and most powerful class of costly car, the Marmon company has now turned its attention to making a vehicle that will out-perform any it has made before and at the same time weigh vastly less. The new car is in every sense a luxury machine, yet it is 1000 lb. lighter than the great majority of automobiles in its class.

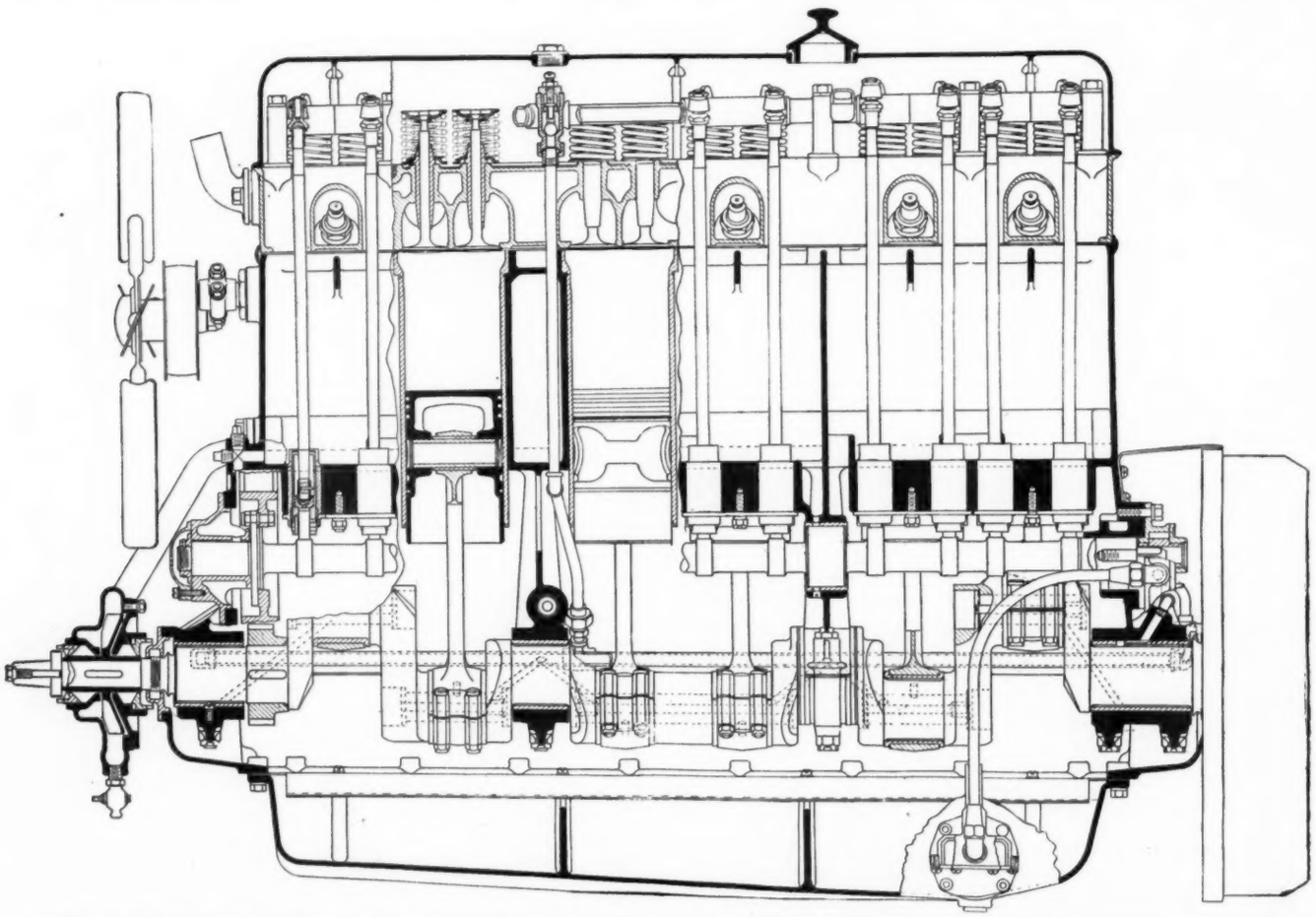
As a performer on the road its accelerative power on high gear is indicated by its ability to speed up from 10 to 50 m.p.h. in substantially less than 18 sec. Its maximum speed is between 60 and 70 m.p.h., it seats seven passengers with the comfort which is expected of the most expensive cars, and it has an unexcelled ease of steering and control.

The light weight has been secured by means of highly scientific design in combination with careful choice of material. There is much aluminum employed and much high tensile steel in thin section. The new car is new from stem to stern, from the motor to the rear axle no single opportunity has been missed where there was a chance to increase efficiency or reduce weight.

With this preamble the detail of the specifications may be considered, and some more concerning the performance of the car will be given later.

The engine is the first automobile motor to be placed in regular production with an aluminum cylinder casting. It is a six 3.75 by 5.125 in. with a piston displacement of 339.7 cu. in. The cylinders are cast in block with a detachable head and all the valves are located in the head, but the camshaft is in the customary position. The valves themselves are 1.75 in. clear diameter with a lift of ⅜ in. and the engine develops over 70 hp. at 2500 r.p.m. Thus the motor is not only a large six but a six of high efficiency.

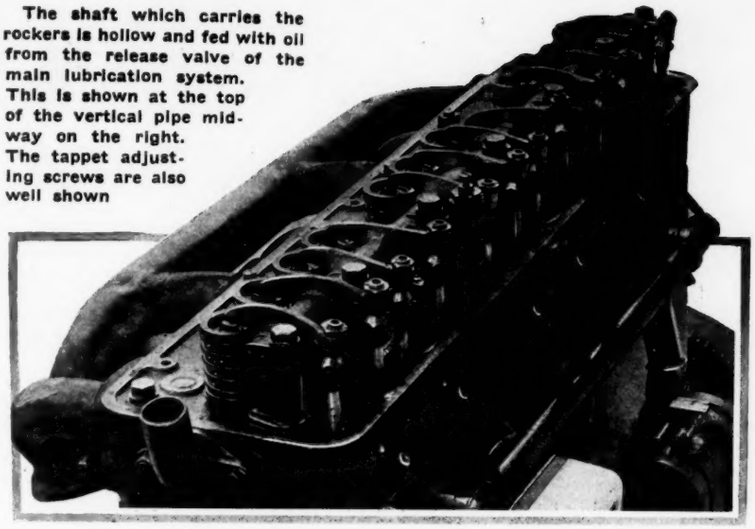
On the score of vibration the ever-present tendency to



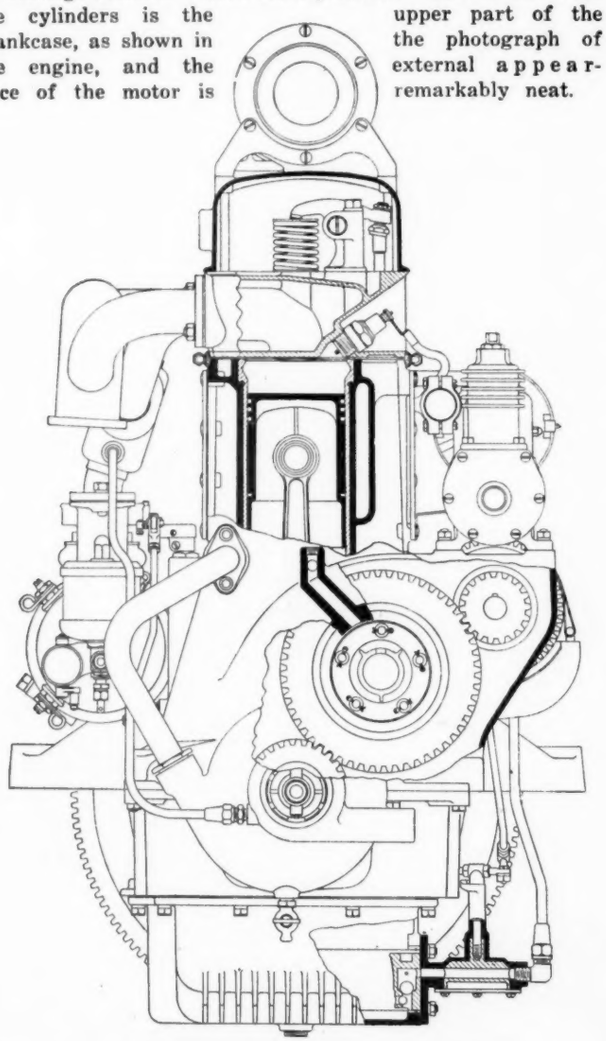
Motor of new Marmon chassis. It has aluminum cylinders with cast iron sleeves inserted, and above, all the aluminum parts are shown in black, the section lining being reserved for iron and steel parts. The lubrication system is outlined, the pump being on the camshaft and the oil throttle valve on the end of the suction pipe in the crankcase. It is connected to the carbureter throttle

crankshaft deformation in a six has been countered by the use of a 2.25 in. crankshaft with four main bearings, there is no detectable vibration at any speed between 3 and 65 m.p.h. Quietness has been attained to a high degree, the complete inclosure of the overhead valves eliminating sound from the tappets more effectively than is the case on most motors of normal design. Absence of torsional oscillations in the crankshaft renders it easy to make silent the front end gears, and there are no accessory drives which can easily produce noise. It is no exaggeration to say that there would be extreme difficulty in judging the number of cylinders except by the nature of the exhaust at low car speeds.

Nor is this motor geared very low on high gear in order to give the remarkable ability which the car exhibits since the ratio is 3.69 to 1 with 34-in. tires, giving a crankshaft speed of 1095 r.p.m. at 30 m.p.h. Into the aluminum cylinder block thin iron sleeves are pressed after machining is completed, in order to provide a working surface for the pistons, which are also aluminum alloy made by the permanent mold process. At present the head casting which carries the valves is iron, but it is hoped to be able to make this also in aluminum with iron valve seats when the supply of castings becomes a little more plentiful. Cast in unit with the cylinders is the upper part of the crankcase, as shown in the photograph of the engine, and the external appearance of the motor is remarkably neat.



The shaft which carries the rockers is hollow and fed with oil from the release valve of the main lubrication system. This is shown at the top of the vertical pipe midway on the right. The tappet adjusting screws are also well shown



Cross-section of new Marmon aluminum motor. Observe that these timing gears suffice for all drives. The excellent cooling round the valves is well shown

Lightness in the power plant does not depend solely upon the utilization of aluminum however, since simplification of design also plays its part. For instance, there are but three timing gears, a pinion on the crankshaft and one for the generator and magneto drive with the large camshaft gear intermediate. The water pump is ingeniously made up on the front end of the crankshaft, the material being aluminum and the packing glands of very large size and very easy to tighten.

Lightness Obtained by Ingenious Design

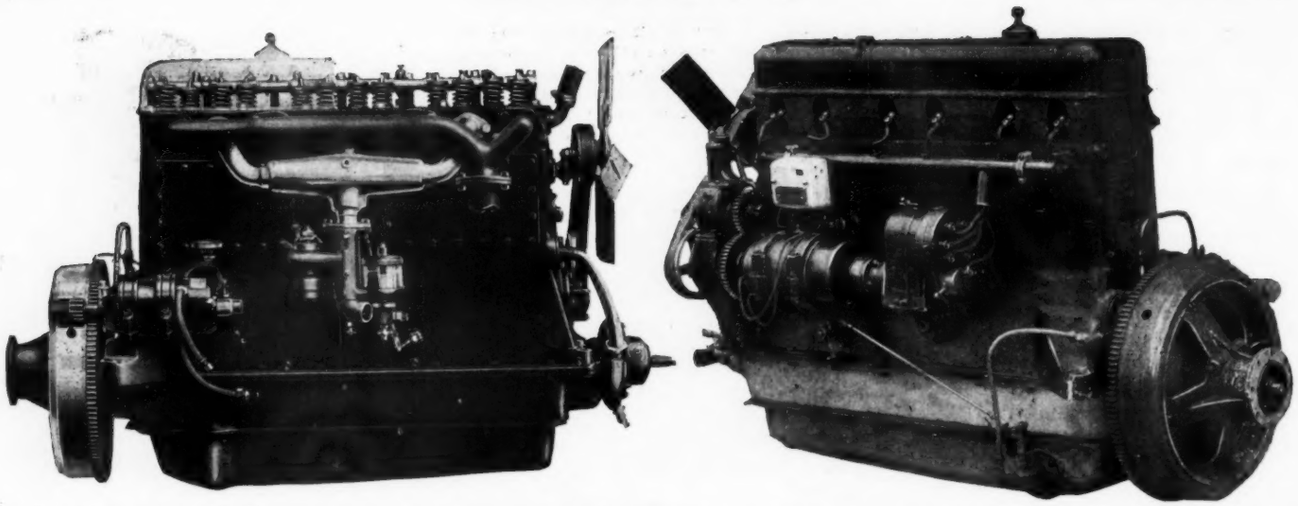
In the valve gear lightness is obtained in every detail. Tappets are die-cast with large bearing surface and a minimum of material for the size, the long push rods which connect with the rockers are aluminum alloy with steel ends, the rockers are highly finished forgings of alloy steel and the valves themselves are light for their size.

A point which doubtless assists quiet operation is that the push rods are inclosed entirely, and adjustment is provided on the rocker ends. The ends of the push rods are hemispherical and fit in sockets in little screwed set pins which are locked by split, conical seated nuts; the adjustment is rapid and delicate, while the locking is absolutely secure.

One reason that the overhead valve motor has not been more popular is the difficulty in lubricating the parts properly. In the Marmon this is cared for by making the rocker shaft hollow, and pumping oil to it, whence it escapes through the bearings and returns to the crankcase. Each little set screw which bears on the upper end of the push rod is hollow, and oil spray keeps it filled, so maintaining lubrication at this point, while overflow passes down the rod and cares for the lower end. Altogether the valve system is lubricated much more efficiently than is usual on L head motors and the precautions for draining the surplus are such that there is no possibility of oil seeping down the valve stems and so reaching the combustion chamber.

As to the main oil supply, this is controlled in an unusual way. On the rear end of the camshaft is the gear type pump, partly contained within the crankcase casting, and this sends oil to the four main bearings of the crankshaft, thence through drilled holes to the lower connecting-rod ends and thence by spray to the cylinders and wristpins.

It has been explained that oil is fed to the hollow rocker shaft, but this is not sent up under full pressure. At the center of the main oil lead, which is cast-in the crankcase, there is a vertical standpipe at the top of which is the pressure release valve, and it is through this release valve that oil goes to the rocker shaft. Also, besides the other oil feeds, the tappets are contained within a chamber separate from the crankcase proper and this is kept filled with oil so the



These views of the motor show its remarkable cleanliness and the great accessibility of the electrical units and of the carbureter

cams and the tappets operate beneath the surface of a tankful of lubricant.

Again, the oil supply is regulated in proportion with the work done; when the throttle is wide open the pump receives a full supply and delivers full pressure, but when the throttle is closed a constriction is put upon the suction intake of the pump and the supply thereby cut down. The device is a simple tap of large dimensions, and it is so arranged that no maladjustment can shut off the supply entirely; the tap is a loose enough fit to permit the passage of a great enough supply to feed the engine adequately when idling. The effect of the control is greatly to economize oil and to reduce the tendency to carbonize, already greatly reduced by the extremely efficient cooling furnished by the aluminum pistons and cylinders.

Engine Wonderfully Accessible

The engine is one of the most accessible ever built. An easily removable cover lays bare the valves in a moment, the carbureter, a Stromberg, stands high on the right side, the Bosch generator and magneto equally high on the left. The glands of the water pump can be reached without effort, the oil pump and the oil throttle are both removable without disturbing any other parts. As can be seen from the photograph, the spark plugs stand in the side of the head casting, and have wires of only a few inches in length, while all but three of the lighting equipment wires are centralized in the control box which is mounted upon the generator. The oil filler is in the extreme top of the cylinder block and the level gage is a quadrant situated horizontally just beside the carbureter. There is nothing which requires to be "reached" for. Carbureter accessibility and the accessibility of the starting motor is enhanced by bringing the exhaust manifold down at the front end of the motor, and this also keeps the heat away from the driver's compartment.

The foregoing deals with the main features of the motor, but there are many points of minor importance displaying as great an ingenuity; they are mostly made clear in the illustrations.

Frame Is Elaborate Structure

Passing on to other parts of this novel car, mention may next be made of the frame, since this is another place where much weight has been saved. In section the sills are narrow, and of thin stock, but the depth is 10 in. and use is made of the steel running-boards to provide much of the strength. The main side pieces end with the running-board, which is upswept at this point, so forming the front end of the mudguard, and the end of the body is supported by a separate portion riveted to the principal side pieces. Across this is a deep, cross member which makes the tonneau heel board; so the rear end of the body consists of nothing more than the back and sides of the seat. Although of such thin steel, the frame has its various parts so proportioned that the dead metal is reduced to a minimum, and it is thus stronger than usual as well as lighter.

Next, the body becomes light by virtue of the frame construction, as there are but three pieces, the cowl, the front seat and the rear seat. These are of sheet aluminum on light wood frames and carry the doors, which are remarkably free from shake owing to the immense rigidity of the very deep frame section. Thus properly speaking there is no separate body, both body and chassis are a unit and reduplication of strain bearing parts is thus eliminated completely.

However, to return to the chassis, the gearset is located on the forward end of a long torque tube, so forming a unit with the rear axle, and the clutch connects to the gear shaft by a universal joint, the only universal on the car. The clutch itself is the only part which is almost unchanged from previous Marmon practice, it being a fabric cone with aluminum center, the flywheel having the cushion spring inserts which have been largely instrumental in making the Marmon clutch so successful with large, powerful engines.

To suspend the end of the torque tube so that the rear axle shall have freedom of movement in all directions, there is a very large ball and socket joint, the ball being secured to the gearbox and the socket to the frame. Then, to connect the gear shaft to the clutch is a short shaft with a universal at the rear end and a universal coupling at the front end. The latter consists of a gear wheel with rounded teeth, set into an internal tooth gear which is part of the clutch. The centers of the ball support and the universal are as nearly as possible the same, so very little motion is put on the front end coupling.

Clutch Draw Combines Brake

In the center of the short clutch shaft are three collars like the thrust collars of a marine propeller shaft, and inclosing these is a casing which is oil retaining and forms the

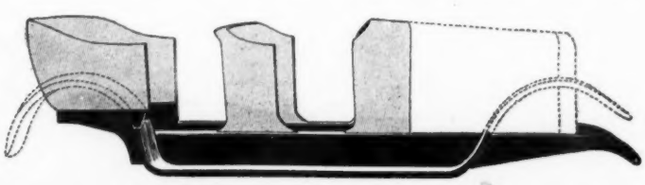
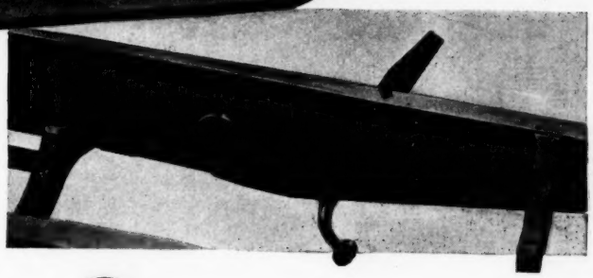


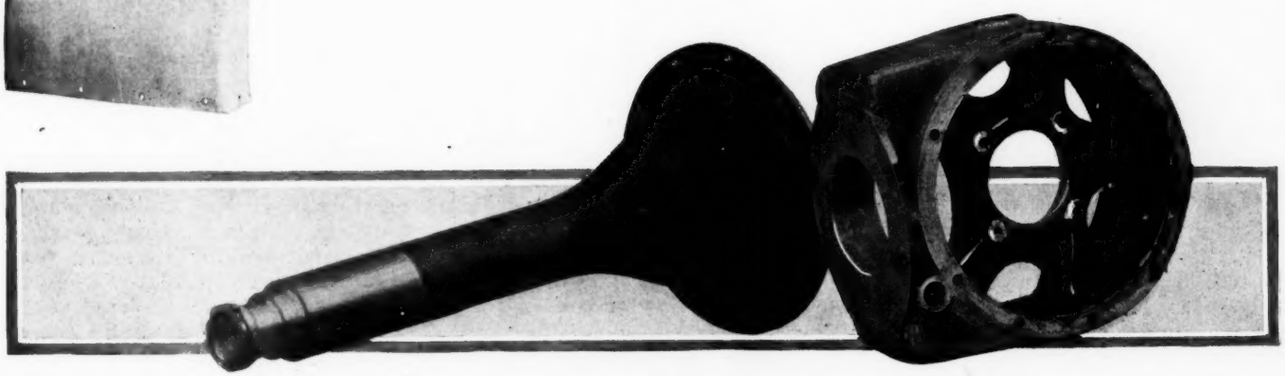
Diagram of the Marmon unit body construction. The main frame is also the body frame and there are no wood sills

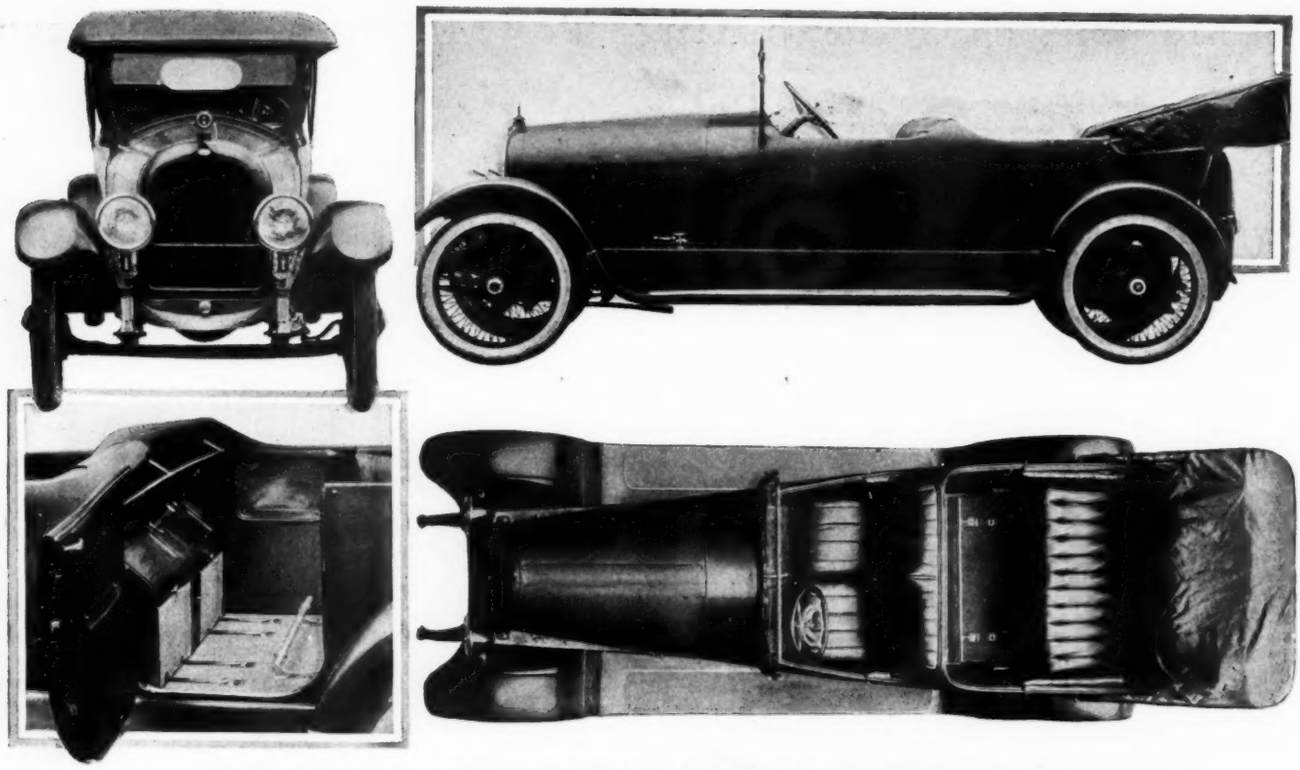
Some Parts Contributing To Marmon Lightness



The frame is so designed that every ounce in it does work, even the running boards supply stiffness and carry weight. It is made of many pieces of thin steel and the details are carefully joined by rivets. The small view on the right shows detail of this riveting at the point where the steering gear is attached and the left running board is bent up to form a portion of the fender

The aluminum casting for the cylinders as it appears in the rough state shows the compartment in which the push rods lie. The radiator shell is an aluminum casting of great rigidity, insulating the more delicate core from shocks and strains. The fenders are made from single sheets of stout aluminum and the rear axle has an aluminum center case with thin, cold drawn steel tubes





Four points of view on the new Marmon body in standard seven-passenger touring form

medium for clutch withdrawal, the lower end of the pedal linkage pressing on this case. The plain thrust collars provide a natural amount of friction for the purpose of braking the clutch but not so much as to interfere with the ease of changing down from a high to a lower gear. A quick change down and a leisurely change up can be performed with equal ease.

Since the front coupling of the clutch shaft is held from oscillation by a spring there is no chance for the development of rattle and the universal, being so far from the axle, has a minimum of movement. Incidentally, its accessibility is enhanced by its situation in front of the gearbox, so it is far easier to replenish lubricant than if in the customary place. In designing the gearset, which provides three speeds, the aim has been to obtain the greatest possible degree of quietness, hence the countershaft is stationary and the gears revolve upon it on plain bushings. For the main shaft Hyatt roller bearings are employed with a Hyatt spigot bearing and a single ball bearing to support the front end of the constant mesh pinion and care for thrusts.

The driveshaft is tubular and contained within a drawn steel tube, having a casing at the front end to which the gearbox is bolted. Within this case is a skew gear drive for the speedometer and a disconnecting coupling which joins the driveshaft and the gearshaft. Also on this case are the ends of a pair of rods which run to the outer ends of the axle, for the purpose of triangulating and stiffening the unit. In connection with these rods is a petty detail which is typical of the care and thought displayed throughout the car, for the yoke pins which secure the rod ends to the axle and to the gearbox are taper, and fit in taper sockets, so that when driven in with a tap from a hammer all slack is taken up.

Rear Axle Light, but Strong

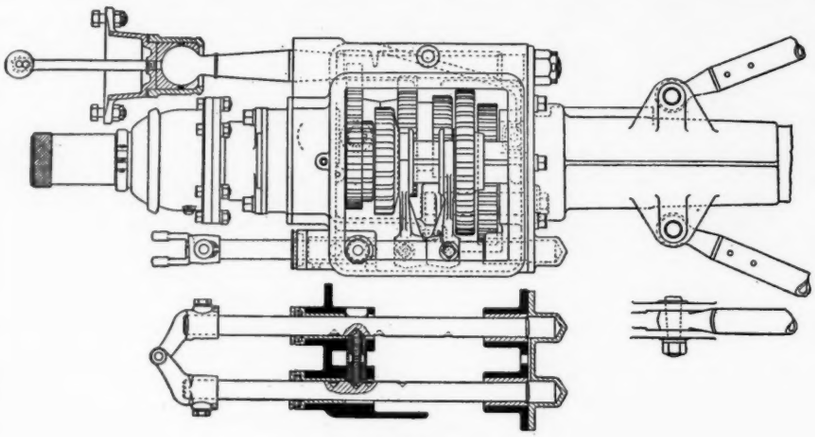
Coming to the rear axle, this contains one of the finest examples of cold drawn steel work ever found in an automobile, the tubes being each made from a single billet of steel in the Prest-O-Lite plant at Indianapolis. The center case is an aluminum alloy casting and carries everything connected with the gears. Located at the geometric center of the spiral bevels is a double row ball bearing and, being in this position, it supports all driving stresses. The other end of the differential carrier, behind the ring gear, thus requires only a steady bearing, and this consists of a large Hyatt roller set in a conical socket which takes its own natural place in the conical steel tube. The driveshafts are secured to the hubs, and can be withdrawn from the differential, while the wheels are mounted on large, single row ball bearings.

To carry these bearings a piece of steel is turned, socketed into the end of each conical tube, and then riveted in place. There are no castings or forgings to hold the brake cams; instead, dished steel pressings are used, also riveted to the main tubes, and having attached to them the necessary small bushings to carry the brake operating shafts. The brakes themselves are conventional, 17½ in. diameter and 2 in. wide, the operating toggles being of such proportions that exceptional power is provided. To prevent egress of oil through the wheel bearings, multiple felt washers are put in each end of the axle, and a screw thread cut on the driveshaft carries excess oil always inward back toward the axle center.

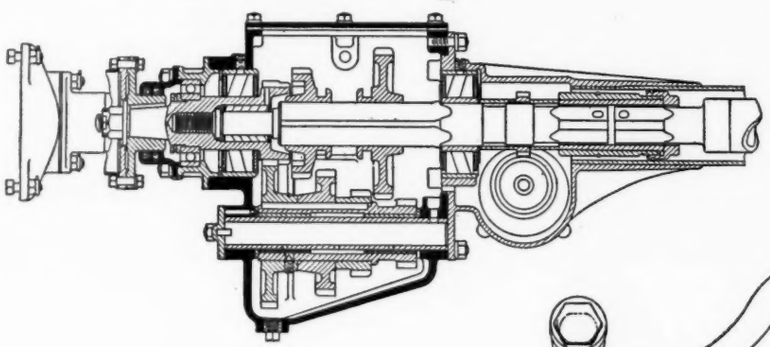
Springs Have Variable Period

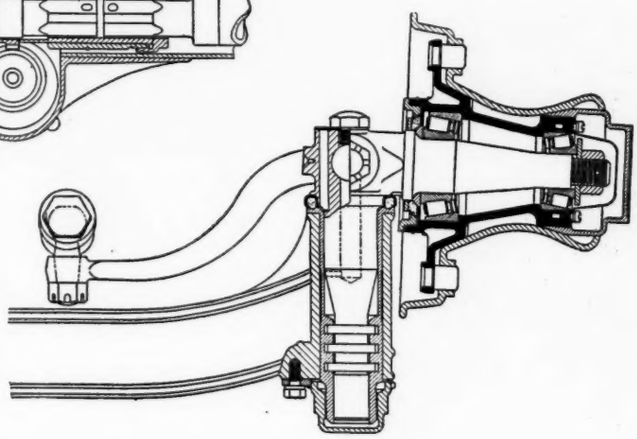
For springs the front axle is attached through semi-elliptics which have no abnormality save that some reversed leaves are placed on top, this making the spring much easier in action and taking out harshness. It has the effect of a shock absorber. At the rear the springs are unconventional, there being two of semi-elliptic form set transversely one above the other and back to back. To follow the action it is necessary to refer to the photograph which shows that the upper spring is slightly the shorter and that there is a piece of wood between the pair cut to a curve and with projecting ends.

On the right side the springs are attached to simple pins on the axle and frame respectively, while each spring is shackled at the other end. Taking a bump which is equal on both wheels both springs operate together and as they compress they come more and more into contact with the wood, which spreads the width of support and, by thus effectively shorten-

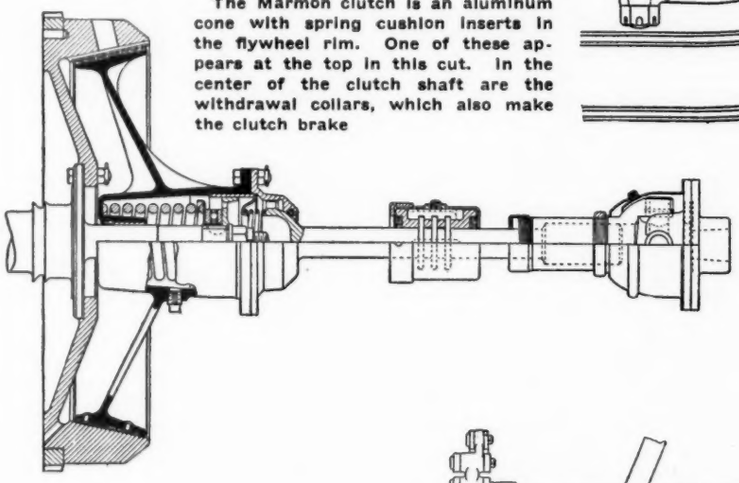


The chief points to observe in the drawing of the Marmon gearset are its method of assembly as the front end of the torque tube and its attachment to the frame. The large ball seen in the top left corner sets in a socket on a cross member of the frame and gives complete freedom of movement to the transmission assembly. Behind the gearset proper is a case which incloses the speedometer driving gear, and this forms the torque tube head. A disconnectable coupling links the gear shaft to the propeller shaft. Taper pins in taper sockets are used for the attachment of the stay rods which triangulate the axle and gearset assembly.

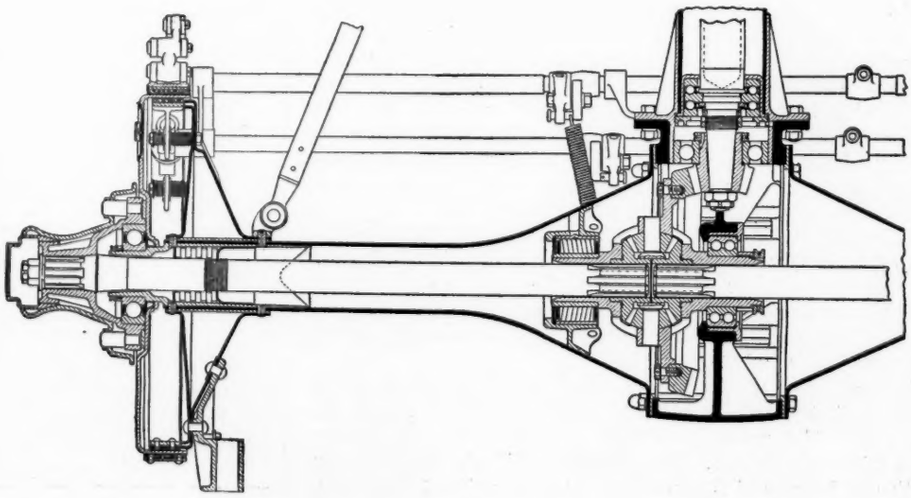




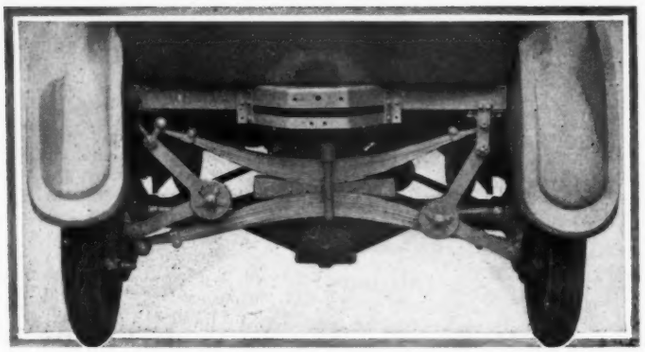
The Marmon clutch is an aluminum cone with spring cushion inserts in the flywheel rim. One of these appears at the top in this cut. In the center of the clutch shaft are the withdrawal collars, which also make the clutch brake



The front axle swivel on the Marmon is absolutely waterproof and once filled with oil it cannot escape. The weight is taken by the three collars which, being in a perpetual oil bath, move with very little friction



The differential case of the Marmon is an aluminum casting strongly webbed and ribbed. The sleeves are of thin, cold drawn steel tubes, the end pieces being put in afterward. It is a light but very strong construction



Marmon rear spring suspension

ing the spring, stiffens it in proportion to the violence of the shock. The natural expectation, however, would be that a car so equipped would be liable to roll, while in actual fact there are few cars so innocent of this fault. The explanation is that one spring being shorter than the other their periods are different and one damps out the other, which action is intensified by the effect of the wood separator.

To test this springing the writer drove the car over moderate gravel and dirt roads at speeds from 10 to 50 m.p.h. with a single 140 lb. passenger in the rear seat and no bump was sufficiently severe to separate him from the cushion. This is a rough test only, of course, but it is fairly severe.

Very Easy Steering

Even in the front axle there is novelty, and a very important novelty too, since it is a feature which improves the ease of steering and renders the improvement lasting. This is the construction of the swivel, which is absolutely waterproof and oil retaining. The swivel axle is shaped like an inverted L and the downward projecting vertical part has three integral collars turned upon it. A split bronze bushing, turned to fit the collars is then put on the spindle and pushed into the bored end of the axle forging, a large cap, something like a hub cap, is then screwed on the bottom of the split bush and locked firmly to the axle, so the swivel pin thus stands in a cylindrical container with no opening save a narrow crack at the top. This is closed by a protecting washer and the pin is drilled to hold oil which is put in through a plug in the extreme top. Since the oil cannot escape it requires replenishment at long intervals only, and the three collars provide a thrust bearing of so large an area that the pressure per square inch is low and movement consequently easy. The design is stronger than the ordinary forged axle as well as being neater and far more effective.

To mention a few other details briefly must suffice, though it would be possible to treble the length of this description. The body, the construction of which has already been described, has a unique feature in that the upholstery is all detachable, being made up in separate units, so in an hour a complete change in upholstery can be made. The finish is of an even better class than that hitherto provided on Marmon cars and the very high sides give extreme comfort. As to the appearance the illustrations are the best criterion.

It is a high-sided type, with a high hood and, if it is necessary to classify it, would belong somewhat to the Italian school of automobile engineering. The folding seats of the seven-passenger model close into a cabinet as shown in one of the illustrations and the body *looks* quite massive despite its remarkable lightness.

The car is delightful to handle. Not only does the engine possess that elasticity and smoothness which characterizes the first half dozen cars of the world but every control operates with small effort. On a rough road it is easy to steer with one hand, and then with but a light grip of the wheel. The clutch needs only a little pressure to disengage it and the service brake has leverage enough to pull the car up smartly without more force on the pedal than the average woman could easily supply. Both gearshift and emergency brake levers are positioned so that they can be grasped without moving the body.

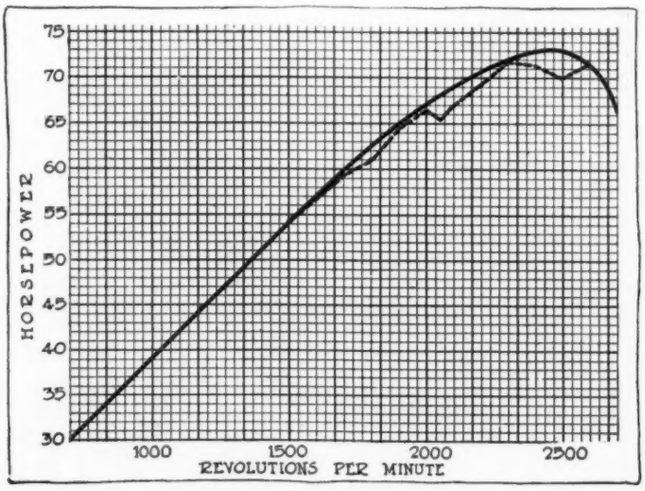
On Indianapolis speedway the mean results of a large number of tests made in both directions on opposite sides of the track showed the following accelerations: From 10 to 20 m.p.h. 3.6 sec., 10 to 30 8.0 sec., 10 to 40 12.4 sec., and 10 to 50 17.6 sec. The half mile was repeatedly covered in several seconds under the half minute. Cornering on the speedway at about 60 m.p.h. there was hardly any roll on the rear springs and the steering operated as easily as on the road at half the speed. Published on this page is the power curve pulled by the engine with which these tests were made about two weeks later, before it had been cleaned out and just as it came from the chassis. In running trim and with supplies, as tested, the weight was just over 3600 lb. but the cars now coming through in regular production are about 100 lb. or more lighter, since there remained a few places where a little more metal could be cut, and this has been done.

In conclusion it is hardly necessary to itemize the equipment which is simply what the buyer of an expensive car expects to get. Tires are 34 by 4½ in. Silvertown cord, the wheelbase 136 in. and the Hartford shock absorbers shown in the illustrations are included. The price for the seven-passenger touring car is $2,750, for the five-passenger touring car, three- or four-passenger "Club" roadster, $2,700.

This new car replaces all previous Marmon models, which are no longer to be manufactured, and since it is so novel a chassis, it should be explained that the design is the product of several years' work. Various of the features which go to make its character have been tested individually, and the complete car has undergone severe trials on road and speedway.

One of the first experimental models was taken right across the continent at an unfavorable time of year, encountering roads in the worst possible state, so the experimenting has been carried out in as thorough a manner as could be desired.

The car has been ready in its final form for several months, the manufacturers desiring to be able to commence deliveries practically as soon as the announcement was made; actually it has been in production for many weeks and some parts were coming through the Marmon machine shops as long ago as September. The car will, like other Marmons, be built entirely in the company's plant at Indianapolis, which has recently been enlarged and rearranged to suit a single model program, and the whole organization is prepared for an output considerably in excess of that of any previous model Marmon car.



Power curve of Marmon motor

The Rostrum

Requirements of Automobile Lubricants

EDITOR THE AUTOMOBILE:—Kindly tell me the necessary qualities for an oil of the first grade to meet the demands of modern high speed racing cars with forced feed lubrication, such as were used in the Indianapolis and Sheepshead Bay record smashing races? As I am interested in getting at the undeniable facts concerning the class of oils that are proving their superiority by the results in actual service of both special racing creations and modern fine motor cars for touring, I would appreciate your telling me whether Castor, Pennsylvania, Oklahoma, or Texas oils are showing any indications of individual qualifications that will be really more desirable?

1—According to the best modern experience and available data, what oil specifications of viscosity, gravity, flash, fire, cold test, and carbon residue are considered essential to an oil of the very first quality and grade for modern touring car motors, such as the Pierce, Packard, Stearns-Knight, Locomobile, National, Mercer, Chalmers, Jeffery and Hudson?

2—Do the race drivers use Castor oil exclusively in their high-speed motors with forced feed lubrication?

3—Is the castor oil compounded with any other kind of oil?

4—If it is compounded, what kind of an oil is used and what are the proportions used? Pennsylvania, Oklahoma or Texas oils?

5—Is a straight Pennsylvania oil used?

6—What are the preferred brands generally used?

7—Can you give me the viscosity, gravity, flash, fire, cold test, and carbon residue of four or five of the best oils?

8—Is a Pennsylvania oil used that is compounded with any other oil?

9—Do any of the race drivers use Oklahoma, Illinois or Texas oils?

10—Can you tell me whether such oils are ever compounded with Pennsylvania oils for the demands of the drivers?

11—Do any of the great race drivers mix an oil of one brand with another oil of lighter or heavier body to get an oil that they seem to be better satisfied with? If so, can you tell me what improvement they strive for? The results they desire might be better secured by making an oil to meet their special requirements.

Warren, Pa. J. L. S.

—It is generally accepted that an oil for use in the oiling system of modern automobiles should have a high flash point so that it will remain a lubricant and resist blackening and deterioration for the longest possible period. An oil of low flash will blacken, deteriorate and thin out quickly, losing its lubricating properties and consequently the oiling system will need to be cleaned out and replenished with fresh oil much oftener than it would be when a high flash long wearing oil is used. The requirements of different cars vary materially as motors having large bearing surfaces require different oils as far as body is concerned from those which have other areas of bearing surface.

According to oil manufacturers an oil for use on cars which have large bearing surfaces, like the Packard, for instance, should be light bodied and have a viscosity of 175 to 210 Saybolt, to work best. On cars such as the Pierce, Locomobile, Chalmers, Jeffery and Hudson a medium-bodied oil at about 250 deg. is very satisfactory. On cars like the Stearns-Knight, National and Mercer a heavy-bodied oil of about 325 deg. viscosity is most satisfactory.

In general cars which are habitually driven at a higher rate of speed should use a heavier-bodied oil than the same cars driven at lower speeds. For fast driving an oil should have a heavy body and a high flash test in order to withstand the more severe conditions.

Authorities state that gravity is immaterial except as it indicates the grade of crude from which the oil is produced. Pennsylvania oils are generally accepted as desirable for automobile lubrication and they are of high gravity.

Low cold test is not so essential in present systems although it is desirable to have the cold test as low as possible consistent with a high flash test. In other words, it is not considered desirable to sacrifice a good flash test in order to secure an abnormally low cold test. In present day lubricating systems, an oil with a cold test of 25 deg. Fahr. should be satisfactory.

2—Very few racing drivers use pure castor oil. In the big races there have not been more than one or two drivers in each instance.

3—Nowadays, if castor oil is used it is not compounded but in former years it was some times mixed with alcohol. It may be that some drivers are using a mixing process of their own which is privately kept to themselves.

4—Some of the oil companies are compounding castor oil with mineral oil, for instance Crystal Oilzum, which is used by a great many drivers is compounded by a special process of castor oil and Oilzum, mineral gas engine cylinder oil. In this case, the mineral oil used is straight Pennsylvania.

5—Yes.

6—The brands of oil used in each race can be determined by referring to the issue of THE AUTOMOBILE following each race of any importance. In this issue there is given in each instance an equipment table which mentions the brand of oil.

7—This is entirely dependent upon the car for which the oil is used and what would be a good oil for one car might be a poor one for another owing to the different areas of bearing surface and the different systems of lubrication. A few examples of what companies are using or recommending for their cars might be of interest. The Hudson Motor Car Co., uses at the present time a heavy Polarine for summer and a light Polarine for winter. The properties of these two oils are as follows:

Properties	*Light Polarine*	*Heavy Polarine*
Gravity	.901	.907
Flash Point	373°F.	385°F.
Fire Test	420°F.	437°F.
Cold Test	–2°F.	–4°F.
Viscosity (70° F.)	242.5	529.4
(Tagliabue) 212°F.	86.2	93.6

The Packard Twin Six instructions state that the oil best adapted for this car is light in color and has the following properties:

Gravity, Baumé, 28.5 to 29.5.
Viscosity at 100° F. Saybolt, 285 to 300.
Flash Deg. F. 430 to 450.
Fire Deg. F. 495 to 500.

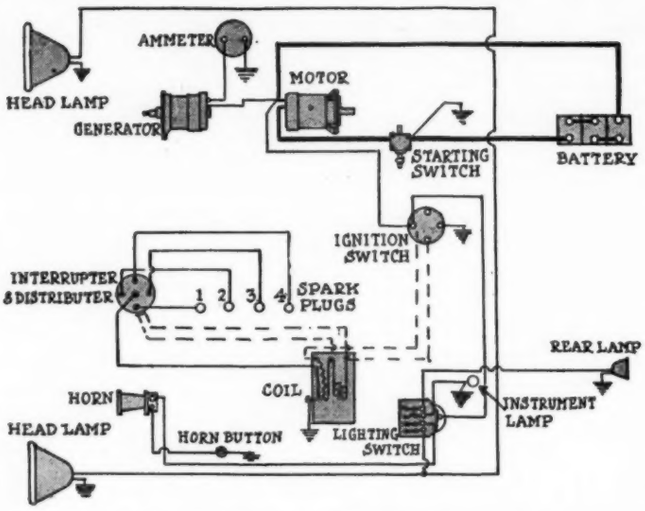


Fig. 1—Wiring diagram of Bijur lighting and starting system on 1916 Model N Hupmobile, showing ammeter installation between generator and ground

The Chalmers concern state that the viscosity for their cars Tagliabue at 70 deg. Fahr. should not be below 220, Gravity at 60 deg. Fahr., not below 29 Baumé. Flash not below 400 deg. Fahr., cold test not over 20 deg. Fahr. A large number of concerns specify a brand of oil which is marketed under the name A and B according to the grade. These properties are as follows:

Properties	*A*	*B*
Gravity	24.5	26.5
Flash Point	415	520
Fire Test	280	590
Cold Test	40	42
Viscosity (104°F.	307	1306
210°F.	49	125

8—Yes, this is done.

9—We have no record of any drivers who do this.

10—There does not seem to be any object of doing this as this would reduce the flash test and an extremely high flash test is necessary where an oil is used for racing purposes.

11—We do not know of any drivers who mix an oil of one brand with another of lighter or heavier body. In such oils as Crystal Oilzum the compounding is done to make an oil that will be faster than pure castor oil.

Mounting Ammeter on 1915 Hupmobile

Editor THE AUTOMOBILE:—Kindly give me full instructions for installing and connecting an ammeter on a present model Hupmobile equipped with the Bijur lighting and starting system, also on the earlier model equipped with the Westinghouse system. In addition, I would like to obtain the same information regarding the present model Chandler equipped with the Gray & Davis system and the earlier model having the Westinghouse system.

East Orange, N. J. G. L. C.

—The diagram which will give you full instructions for installing and connecting an ammeter on the Hupmobile is shown in Fig. 2. The diagram in Fig. 1 applies to the Chandler and Hupmobile with the Westinghouse system. An ammeter to be used in these circuits should be of the double-reading type with zero in the middle of the scale and about 20 or 30 amp. each way from zero. It is usual to mount such an instrument on the dash, but of course the position of mounting depends entirely on your desires.

On the Chandler model with the Gray & Davis equipment the ammeter should be connected in the circuit between the terminals B at the regulator cutout on top of the motor generator and the battery, but to avoid the cutting and splicing of wires, it is advised that the wire be disconnected from terminal B at the regulator cutout and connected to one terminal of the ammeter. From the other terminal of the ammeter a wire of the same size should be connected to terminal B at the regulator cutout. When the engine is at rest, light turned on, the ammeter should indicate discharge, the amount used by the lamps. If charge instead of discharge regulations are shown, reverse the ammeter connection.

The Bijur company states that in installing the ammeter in the generator circuit of the 1916 model N Hupmobile with Bijur lighting and starting, the proper way to connect it is between the generator and the generator ground terminal as shown in Fig. 1. Connecting the meter between the generator terminal and one of the motor terminals will produce the same results. Connecting it in the grounded side is simply an easier installing proposition. Connecting the meter in either one of the generator leads will cause it to show generator output only and the meter needle will stand at 0 when the car is at rest regardless whether or not the lights are in use. In other words, the meter indicates only when the engine is running and does not show charge and discharge.

Construction of High-Tension Coil

Editor THE AUTOMOBILE:—In your issue for Nov. 18, the first letter in your Rostrum is one from Mr. Allen, asking among other things several questions with regard to the spark coil. Inasmuch as all ignition, even the high-tension magneto, uses the principle of the spark coil, if not the coil itself, will you permit me to answer somewhat more fully Mr. Allen's question?

The distance that a spark will jump depends, as he suggests, on the ratio of the turns in the two windings and the voltage of the current. The higher the voltage and the greater the difference in the number of turns between the primary and secondary windings, the longer the spark. A spark, however, may be too thin, and this depends in part on the size of the secondary wire, which ordinarily should be Brown & Sharpe, No. 36. It also depends on the adjustment of the vibrator, which may be adjusted so as to permit too small an amperage of current to flow. In a negative way it also depends on the capacity of the core and on the capacity of the condenser—but this only in the sense that if there is an insufficiency on the part of either of these the spark will be under its normal size.

Makeup of the Coil

I assume that your readers all are aware of the general makeup of the coil, which consists of a bundle of soft iron wire in the center, which increases the intensity of the coil action, the winding of two or three layers of coarse primary wire over the core and then outside of the primary wire the winding of many turns of fine wire, forming the secondary wiring, and finally a number of layers of tin foil, alternating with parafine paper, and connected alternately and forming a reservoir to take up the electric current when it is broken by the vibrator or other interrupter.

In the first place the sizes of wire used in coils depends upon the number of amperes intended to be carried by the coil. The secondary wire is Brown & Sharpe, No. 36, and that is true if the spark coil is for a ¼-in. spark or one a foot long. The primary wire for the smaller sparks is No. 16. For larger sparks the wire size runs down to No. 10 for a 12-in. spark. The weight of primary wire used does not increase in proportion to the length of the spark but on a very much smaller scale. Six ounces are said to be enough for a ½-in. spark, while seven times that is used for a spark twenty-four times as long.

Inasmuch as the larger coil has heavier wire wound on a larger core, it indicates that there are comparatively few additional turns of wire in the makeup of the instrument. The weight of the secondary wire increases about in propor-

tion to the length of the spark, being for a ½-in. spark the size used in automobile work about ¾ lb.

It is optional to use a slightly heavier wire in the secondary winding, which will result in a shorter and thicker spark, or to use a slightly finer wire, which will result in a longer and thinner spark.

I believe I am correct in saying that the length of the spark for any particular coil depends on the voltage in the primary winding, while the thickness of it depends, within limits, on the amperage in the primary winding. Of course when a spark is not required to jump its full limit of distance, it becomes thicker and more flaming in character.

A spark coil may be used with an excessive voltage, but if so, it will probably ultimately break down by the spark penetrating the insulating layers in the secondary coil, in which case the coil is useless and quite beyond repair.

The condenser sheets of tin foil for a ½-in. spark consist of forty sheets of 3 by 4 in. In the larger sparks the sheets may number as many as sixty and increase in size so as to be about in proportion to the increased length of the spark.

Disadvantage of Too Hot a Spark

A very hot spark increases the strength of the explosion in the cylinder. On the other hand it eats away rapidly the electrodes of the spark plug. It is poor economy to endeavor to save a little in electric current by reducing the amperage to a minimum by manipulating the adjustment of the vibrator. It is true that one can get along with a minimum of current, but in doing so he is losing the energy which the explosion mixture would otherwise be capable of giving.

The voltage in a secondary winding for a ½-in. spark is about 10,000 and, very roughly, proportionately larger or smaller for other lengths of sparks. This, of course, does not mean that the voltage of every coil used is 10,000. It may be less or more according to the number of dry cells or batteries used in the series.

While the voltage is so high, the amperage is proportionately small, being a mere trace of current, for what the voltage gains the amperage loses. For example, if the current in the primary is five volts at 2 amp., this equals 10 watts, and if the voltage in the secondary is 10,000 the amperage is but 1/1000 part of 1 amp.

Aside from injury, due to the breaking down of the insulation in the secondary wiring, there is sometimes an injury due to a break in the condenser. This last difficulty is evidenced by excessive sparking at the vibrator. The only other difficulty to be found is the pitting of the contact points. This can be avoided if the direction of the current is changed occasionally. In many instances this is quite practicable, although not so in all. Reversing the current causes the deposit on the contacts to be reversed and to be put back where it came from.

In very rare instances and in some forms of vibrators the filings from the contact points dropping down may form a short circuit if not brushed away.

Aside from the adjustment of the contact points and the refacing of them when pitted, nothing can be done with a coil except send it back to the factory, if it is out of order. It is quite impossible to reach or repair either the condenser or the secondary wiring.

Spark at Breaking of Contact

It should also always be borne in mind that there is practically no spark at the moment of contact. The only spark worth speaking of takes place at the breaking of the contact. The reason of this is extremely simple. The induced current when contact is made is in the reverse direction to the inducing current and as every winding of the primary wire acts on every adjoining winding, to induce a current opposite to the main current which is flowing in the wire, it is easy to be seen that the current is much reduced in strength, and the same thing takes place in the secondary wiring, so that while there is a small spark it is not of a character to be useful in ignition. Its presence is witnessed by the forms of some of the parts in magneto work, the intent being to avoid the possibility of an explosion due to this unused spark, but even in this work I believe the spark has come to be disregarded.

There are two small booklets, published by Spon & Chamberlain, No. 123 Liberty Street, New York, at 25 cents each. One of these is Induction Coils, edited by Stoye, on the making of such coils, and the other contains a number of experiments possible with an induction coil, most of which I have tried and found very entertaining. It is entitled Experimenting with Induction Coils, by Norrie.

It should be well understood that even a ½-in. coil is utterly unsuited for practical jokes and the current actually dangerous to some individuals.

New York City. CHARLES E. MANIERRE.

Analyzes Gnome Rotary Cylinder Motor

Editor THE AUTOMOBILE:—I noticed in the Nov. 11 issue of THE AUTOMOBILE a criticism of an article on the Gnome rotary cylinder aeroplane engine. In this article Mr. Hartford says that the engine in question is also a reciprocating motor insofar that the pistons reciprocate in the cylinders. So far he is right, but he has failed to analyze further. The relative movement of the pistons and the cylinders is one of reciprocation, but the actual movement is rotary around a given center.

The cylinders revolve uniformly around the center of the crankshaft. The pistons revolve around the center of the crankpin. Owing to the design of the connecting-rods in the Gnome motor, the pistons do not revolve with a uniform speed exactly but in several other motors this difficulty has been overcome.

Mr. Hartford has fallen into the error of many in not appreciating the difference between relative and actual motion.

Of course, all motion is relative, but a discussion could be carried on regarding this forever and never prove anything. In the ordinary type of stationary cylinder engines, the main stresses are those of inertia; in the revolving type, the centrifugal stresses are the highest.

One pound of weight at 1 ft. from the center revolving at 1100 r.p.m., produces a centrifugal pressure of 412.6 lb.

San Francisco, Cal. A. F. B.

Sign Your Inquiries

The Rostrum is in receipt of a number of inquiries which are either unsigned or signed by initials only. All letters to be answered by this department must bear the signature of the sender as an evidence of good faith.

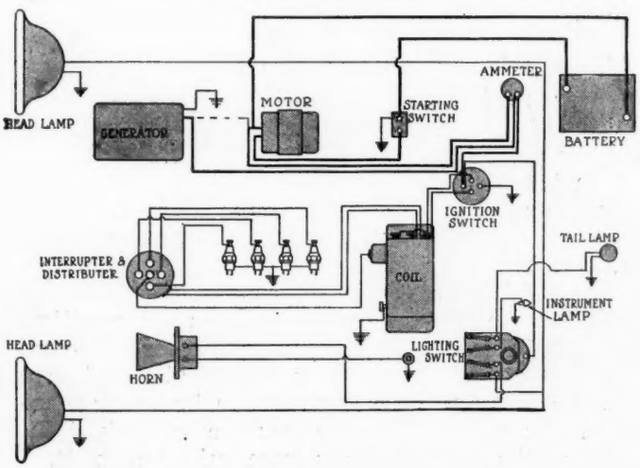


Fig. 2—Wiring diagram of Westinghouse system on Hupmobile and Chandler, showing installation of ammeter

The History of the American Automobile Industry—9

Modern Regime in Steam Construction from 1898 to 1906—Griffiths Recognition of Necessity for Comfort—Gordon's Squirrel Type—Four-Wheel Drive in 1824—Engine on Each Wheel

By David Beecroft

IN the previous eight chapters of this history has been told the early story of steam automobiles in the old world; and their origin has been traced in America from 1743, when John Fitch did his first work at Camden, N. J., up to 1890, when the pioneering work of R. E. Olds, present head of the Reo company, was outlined.

The Modern Regime

The next step in steam development in America was the modern regime dating from 1898 up to 1906, a time when over fifty American makers were building steam automobiles in great quantities and when steam led gasoline. Before taking up this last period it is necessary to devote a few chapters to a review of the most important steam development carried on in Europe from 1825 on, for 50 years, a period in which people were riding over the highways in steam coaches much as our gasoline buses cover rural routes to-day, only not with by any manner of means the same speed or comfort.

It is necessary for a correct interpretation of the steam vehicle of a few years ago, which is still green in the memory of thousands living, to go back over those 50 years and see how many problems they solved, and give them credit for what they accomplished, thereby seeing in a truer perspective the work of our own pioneers of to-day, who were responsible for the steam regime beginning in 1898.

Chronological Recapitulation

Let us briefly recapitulate the progress of steam abroad to freshen our memories with the activities of the pioneers:

In 1698 Thomas Savery, a Briton, built the first steam engine known, not in any sense an engine as we know it to-day, but a steam pump for lifting water.

In 1705 Thomas Newcomen, a Scotchman, revamped the Savery engine and made it practical enough to be the ideal steam engine for 60 years, until James Watt took it up, improved it and gave us the principles of steam as we know them to-day. Newcomen's engine was the recognized engine of the day, all others were imitations of it.

In 1769 James Watt, the Scotch engineer, added the necessary separate condenser, which was what the engine lacked, and that very year the steam engine was used to drive a vehicle.

In 1769 Joseph Cugnot, the French engineer, built the first automobile. He could not do it until Watt made the steam engine practical enough.

In 1770 Cugnot made a steam automobile that hauled 2.5 tons 3 m.p.h. and this vehicle is still preserved in the form of a model in France.

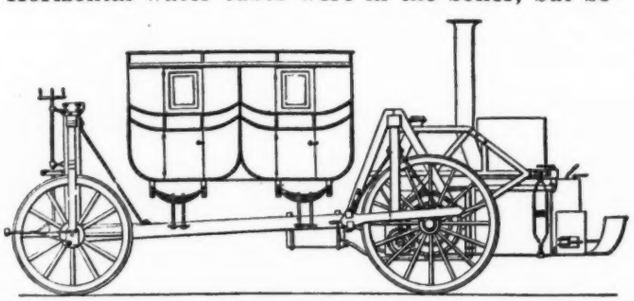
In 1802 the first practical steam automobile was built, Richard Trevithick, England, using a crankshaft for the first time and driving by gears from the engine to the road wheels.

In 1821 Julius Griffiths, England, gave us the first comfortable steam vehicle, the first vehicle to have a coach design of body with seats carried on springs as we know them to-day.

Thus was the growth of steam up to the practical, comfortable age that we must cover before completing the 1898 regime in America.

Griffiths' Semi-Elliptic Springs

Julius Griffiths was a literary man and traveler, not an engineer, which accounts for his developing a comfortable vehicle rather than working on the engineering end. He might be considered a real pioneer of the maker of to-day, who must essentially provide a comfortable vehicle. His steam automobile, built in 1821-22, was patented in several countries and designed to carry 3 tons of merchandise or a dozen passengers at 5 m.p.h. It had semi-elliptic springs under the body and the mechanism was also spring-mounted. The boiler and firebox were behind the rear axle leaving much space for passengers or goods ahead. It was built by Bramah, the leading engineer of that day. Horizontal water tubes were in the boiler, but be-



Griffiths' steam automobile built in 1821-1822 designed to carry 3 tons of merchandise or twelve passengers at 5 m.p.h. Comfort was a feature of the construction

ing small, burned out, because water could not get into them fast enough. The engine was a two-cylinder one and exhausted into a condenser cooled by air, this condenser consisting of thin flattened tubes much as some modern ones have been made. This vehicle was a failure in practical use, but stands foremost as the pioneer of the passenger automobile of to-day.

The Squirrel Steamer

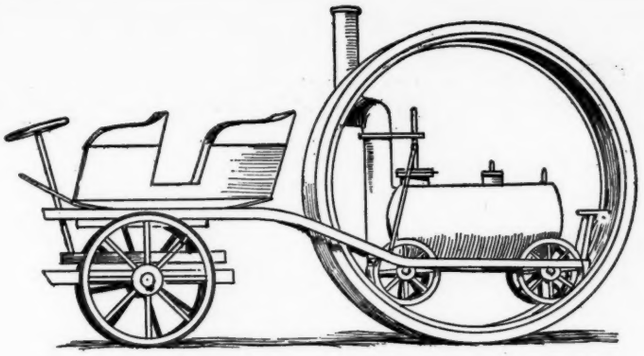
At about the same time David Gordon of England undertook a very novel plan for vehicle propulsion. His engine was mounted inside a large wide wheel, and tended to climb the wheel as a squirrel climbs up its revolving cage, the weight of the engine therefore became the propelling power, and this wheel attached behind the vehicle pushed the vehicle as it rolled. The small engine was placed inside a metal drum, serving as a wheel. This drum was 9 ft. in diameter and 5 ft. long, the smokestack being elbowed to rise at one end of the drum. The small wheels on the steam engine had teeth that meshed into two rings of internal teeth on the inside of the drum.

A Later Construction

Not succeeding in his first novel attempt at steam propulsion, Gordon began exploiting along a different line, and in 1824 obtained a patent in which pushers were the propelling means. This had the steam cylinders, two in number, in the front, horizontally placed on trunnions so that they oscillated and drove a crankshaft having eight throws. The extra six throws, three on each side, were fitted with pushing legs, having feet of considerable area so as to get a considerable grip on the ground. These feet were fitted with bristles of whalebone, which made the contact on the ground less noisy and destructive than a metal surface, but they were also fitted with metal spikes in case the load was more than the bristles could carry. These pushers were between the axles and pressed against the ground at an angle of nearly 45 deg. To stop propulsion these pushers could be lifted by ropes attached to them for this purpose and in turning a corner those on the inside could be lifted, leaving the outer ones to do the work. It worked successfully, though somewhat jerkily, but without sufficient engine power to permit much speed. Similar pushers were afterward fitted.

Four-Wheel-Drive 1824

In this same year—1824—two Scotchmen, Burstall and Hill, worked on a coach having a two-cylinder engine with boiler at the rear and with connecting rods from the walking beams direct to cranks on the axle. The particular feature was the use of two sets of bevel gears and a lengthwise propeller shaft by which the front axle was compelled to drive the rear one. All four wheels were loose on the axle, but connected by pawls and ratchets so they could drive on the straights but allow the outer ones to overrun in turning corners. In this we had the first record of a four-wheel-drive vehicle, a design so much in the public eye in



Gordon's squirrel steamer in which the engine was mounted inside a large wheel and tended to climb the wheel as a squirrel climbs in its revolving cage, the weight of the engine becoming the propelling power and pushing the vehicle as indicated by the illustration

truck work to-day, especially in the arduous service of war.

But there were many more of our so-called modern constructions in use in those days when Waterloo was as fresh in the memory as Warsaw is to-day. In 1825 H. Peto made a steam coach fitted with a two-speed gear, the pioneer of the gearbox of to-day. The automobile was a very light type, also an object of attainment to-day, but was not used much.

In 1827 James Nasmyth, the steam-hammer man, made both a model and full-sized carriage for eight passengers, but after a few months' experience this was broken up. Other experimenters of less importance were also working.

Engine for Each Wheel

W. H. James, England, turned his attention to this subject in 1824, but lacking capital accomplished little until he interested Sir J. Anderson as a partner. His car used a water-tube boiler carrying high pressure, with a separate engine for each driving wheel and with the valves connected to the steering gear in such a manner that more steam was given to the outer wheel in turning a curve. Here was another substitute for the modern differential. This carriage is said to have run over a rough gravel road at the rate of 12 to 15 m.p.h. in 1829. It carried fifteen passengers, was quite tasteful in design, and weighed over 3 tons. A second carriage was soon built having oscillating engines and the feed water heated by the exhaust. Financial difficulties stopped the work, however, which Anderson took up with a new boiler some 9 years later, forming a carriage and wagon company and building a number of vehicles in Dublin and Manchester in 1839 and 1840.

The idea of placing a separate motor on each drive wheel has been tried by several automobile concerns within the last 15 years. There are several electric commercial vehicles using it; and only 5 years ago the Daimler company in England built a gasoline-electric bus for London streets with a separate four-cylinder gasoline engine driving to each rear wheel. The individual drive idea is nearly a century old, and not an innovation of the twentieth century.

Testing Spring Suspension and Dampers

CAREFUL work is now being carried on in the industry with a view to the eventual perfecting of the spring suspension for automobiles and motor trucks. During the past four years considerable attention has been given to this subject in THE AUTOMOBILE, partly in the department entitled Engineering Digest (which, being based mainly upon technical articles appearing in the French and German periodicals, ceased to receive nourishment and began to languish when the engineers of Europe became absorbed in war problems) and partly in original articles. As an example showing how this material is followed up long after its publication, as well as the nature of the questions which arise, there is printed herewith a letter from one of the research engineers of a leading manufacturer of Detroit, and the appended answer may meet the requirements of other investigators. The letter reads in substance as follows:

Editor THE AUTOMOBILE.—I have just been reading an article in THE AUTOMOBILE, issue of June 25, 1914, page 1336, wherein mention is made of the published accounts of experiments with vehicle suspension by Lanchester in England and Bobeth in Germany. I would greatly appreciate information from you as to the names of these publications and where they can be procured.

In another article published in THE AUTOMOBILE, issue of December 18, 1914, mention is made of a recording device perfected by Dr. Bobeth. I am particularly interested in this recording device, and if you can give me any information regarding it, or tell me where I can procure information, I shall greatly appreciate it.

Detroit, Dec. 11, 1915. (Signature)

Die Leistungsverluste und die Abfederung von Kraftfahrzeugen by Dr.-Ing. Erich Bobeth was published in 1913 by M. Krayn, Berlin W. 57, Germany, and can be obtained from him or by order through any book firm dealing in European books. The accounts of the Lanchester experiments were referred to from memory and have not yet been relocated. The recording device used by Bobeth to determine the damping effect of the friction between spring leaves and that of special auxiliary dampers or shock absorbers was used in connection with the same author's arrangement for measuring and recording the shocks due to inequalities of the road surface, and to make its operation clear this arrangement must first be described.

Fig. 1 shows a rear and a side view, it being understood that the road is represented by rotatable sheaves on which projecting blocks with a rounded surface are fastened in such manner that they fall off the sheaves after impact with the wheels, so that the impact is not repeated at each revolution. Two pairs of angle irons AA are laid across the pit containing the sheaves, in the direction of the vehicle, and recesses are machined into these angle irons to afford a firm track for two sliding rails BB which are smoothly planed and on their upper face carry the long glass strips DD standing on edge and on the under side the racks CC which mesh with spur pinions EE. These pinions E on both sides are mounted on a common shaft F which is driven by sprocket chain G from the shaft H of the sheaves. A coupling J permits the release of the connection with shaft H [which is termed the brake shaft by the author, as the sheaves are used for brake tests also].

With the coupling in action the rotation of the sheaves, caused by the vehicle wheels, is transmitted to the spur pinions E, and these drive through the racks CC the rails BB with the glass strips. Their rate of movement is thus determined by the gear ratio when the revolutions per second of the brake shaft are counted. The glass strips are coated with lampblack, and the styluses K and K1, on each side, are connected with the axle and the vehicle frame, respectively, and arranged to press elastically against the glass, so that oscillations of the axle and of the frame are inscribed automatically in sharp lines in the lampblack, the ordinates representing the amplitude of the oscillations, without reduction, and the abscissæ the time elapsed during oscillations on a scale depending upon the gear ratio of the drive and the speed of the brake shaft. Changes in the gear ratio (indicated in Fig. 1 by an auxiliary set of sprocket wheels) admit of getting a suitable time scale for any chosen vehicle speed. [It may be noticed in the side view of Fig. 1 that stylus K which records the axle movements and stylus K1 which records the frame movements are not shown as starting from the same ordinate on the glass strip, and it would seem that either this variation must be notably smaller in practice than it appears in the drawing or else an allowance must be made for it in transcribing the oscillation curves from the glass strip, at least when the question is that of determining accurately the time sequence of axle and frame oscillations.]

Device for Recording Damping Effects

The arrangement used for obtaining numerical values for the forces tending to reduce the amplitude of oscillations is shown in Figs. 2 and 3. The friction between spring leaves is usually considered the most important among these forces, but measurement shows that it represents only one-fourth to

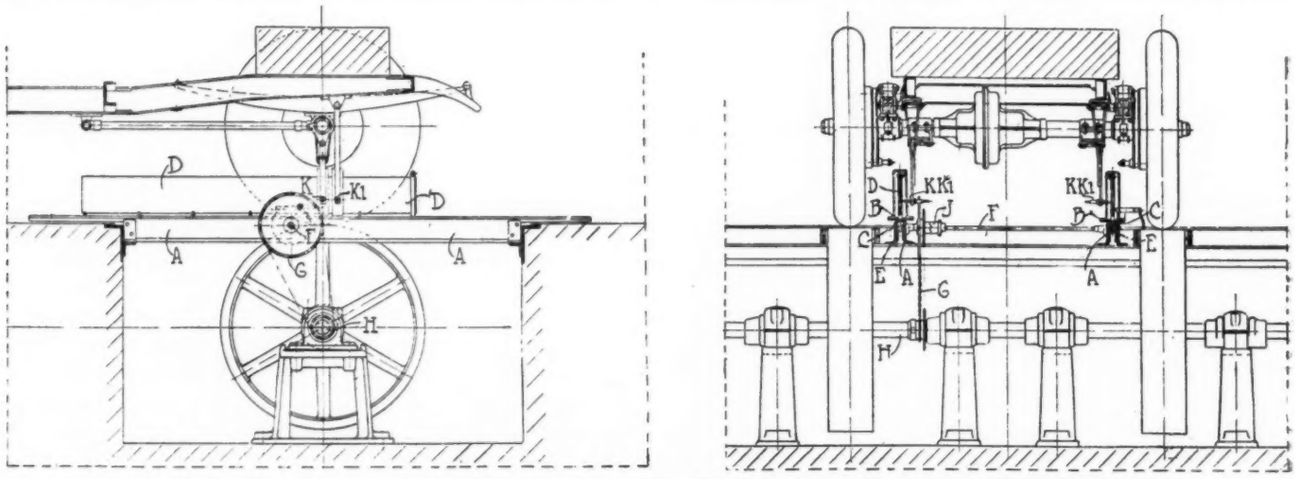
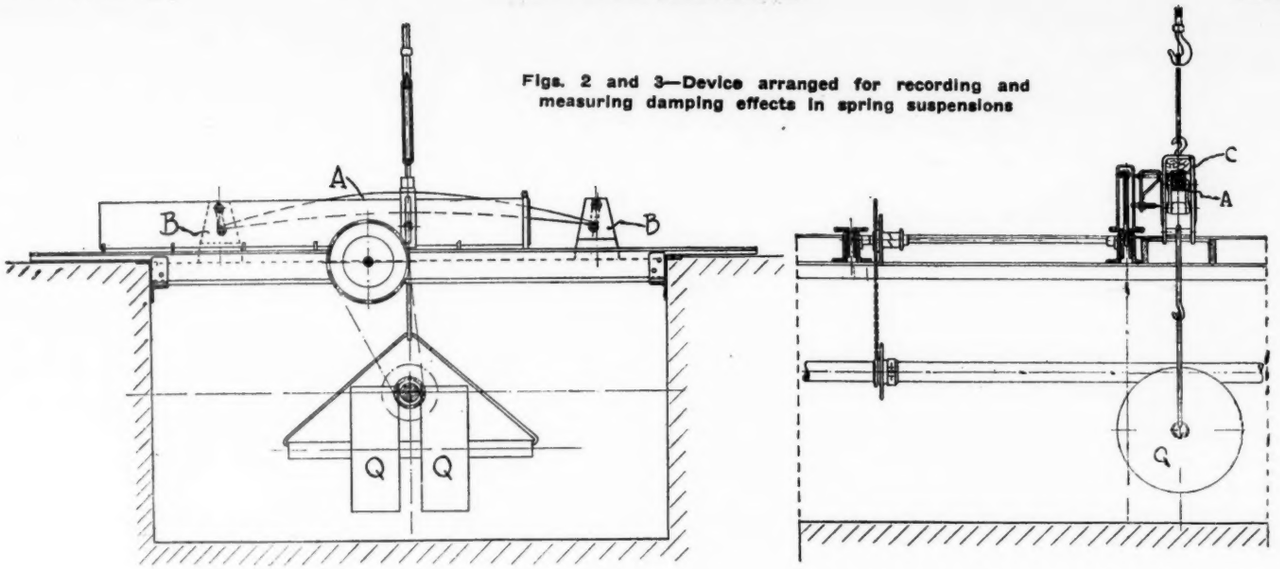


Fig. 1—Side and end views of testing apparatus used by Bobeth for measuring and recording oscillations



Figs. 2 and 3—Device arranged for recording and measuring damping effects in spring suspensions

one-third of the total damping effect produced by various resistances arising when the vehicle springs are oscillating. The movements of spring shackles and bolts as well as of torsion rods and chain adjustment stays cause more or less friction, and the changes in the angle of the power transmission, by way of the universal joints, taking place whenever the relation of axle to frame is changed by spring oscillation always operate in both directions against the oscillations which cause them, the forces required for the acceleration and retardation of the moving parts depending largely upon the rapidity of the oscillations with which they must keep time, and these are not the spring oscillations but the relative oscillations of frame and axle. These relative oscillations are very variable and at times of much higher rapidity than the spring and axle oscillations [as shown in Fig. 10, page 197 in THE AUTOMOBILE for January 28, 1915], causing correspondingly high resistances and frequently, as in case of chughole effects, bringing the spring oscillations to a much quicker stop than would be expected from their amplitude.

The spring A is hung with its shackles, in the same manner as for static determinations of leaf spring forces, in the two supports BB. Over the middle of the spring there is placed a sheet iron bow C loosely inclosing the spring leaves and fitted with a hook at the top and another at the bottom. From the lower hook there is hung a weight Q, causing a deflection of the spring. By means of the upper hook the bow strap with its load may be raised, so as to relieve the spring completely.

In order to be able to use the apparatus shown in Fig. 1 in connection with this device for the recording of the oscillations of the spring, the latter is brought into elastically maintained contact with the blackened glass strip by means of a stylus secured to the bow strap.

Tests were made by pulling the bow strap up so high that the spring was entirely relieved of load while still maintaining contact between them. By a sharp stroke the cord by which the bow strap was held up was then cut, so that the load Q had to be carried by the previously unloaded spring alone. The spring began to oscillate and, as the glass strip at the same time was moving, the oscillations were recorded on it.

In determining the value of the damping factors which bring the oscillations gradually to a stop it was assumed, in the simplest cases, that the resistances during the period of the oscillations were proportionate to their amplitude, so that the relations of the forces are represented in arithmetical progressions. With the force applied to produce the first deflection subject to measurement, the value for the damping forces may be figured from the equation: $2e = a_n - a_{n+1}$, where e is the total damping effect and equals one-half of the difference between the forces represented in two successive oscillations in the progression.

The development in details, as given by Dr. Bobeth, is in the main mathematical upon this foundation, but is supported by a large number of the diagrams obtained from the testing apparatus under different conditions of operation.—M. C. K.

Scientific and Technical Reform

OBSERVING the rapid growth of German industries and trade as well as the efficiency of German war measures many prominent Britons have been strongly moved to urge the speedy reform of traditional British methods. It is especially the science back of the industries upon which attention has been focused. Dr. J. A. Fleming in a lecture before University College, published in *The Engineer* of October 8, dwelled on the need of greater efficiency in all production in order to carry the war debt of 3000 millions sterling now accumulating. Coupling the subject with an explanation of his own scientific and inventive work for the improvement of range-finding and the use of wireless telegraphy in aeroplanes, he urged the revision of school and college plans, to compel more and better work on the part of students, and the energetic extension of co-operative research, both scientific and industrial. The scientific societies should organize and distribute work for definite and formulated problems which are too large and complicated for one man. On the whole Dr. Fleming seemed to acknowledge the superiority of German methods. Different views are represented in the presidential address before the Society of Arts, by Dr. Dugald Clerk, whose services to automobile engineering are widely recognized. The gist of his remarks—which *The Engineer* of November 26 hails as a much needed tonic for every detractor of British progress and British methods—was that "muddling through," as a term supposedly describing the average British method, is a bad misnomer, inasmuch as Britain is still the most successful nation in the world. He spoke of the difference between inductive and deductive methods, ascribing the inductive to England and the deductive to Germany and holding that the inductive or experimental processes for making progress were by far the safest, as shown, for example, by the predicament in which the Germans now find themselves for having presumed to reason out the results of a European war in advance.

Both papers are well worth reading, even though the distinction between "inductive brains" and "deductive brains," as accepted by Clerk, must fail to satisfy all scientists, since all capable persons invariably both "induce" and "deduce."

ACCESSORIES

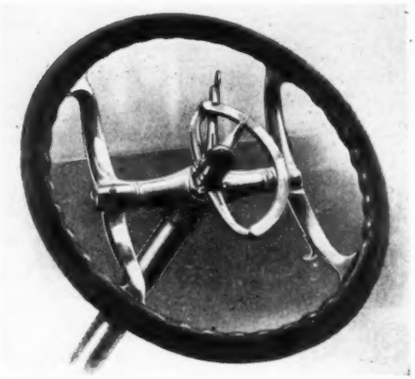
Pouvailsmith Products

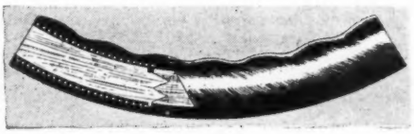
THE Pouvailsmith Corp., the formation of which was announced in THE AUTOMOBILE for Dec. 9, makes a large line of steering wheels, among which a feature is the Warm Hand construction which has been on the market for several years. This device has been greatly improved to conform with modern car design and to meet the demand for a means of keeping the hands warm in winter and on the chilly evenings characteristic of many months of the year. As now manufactured, the Warm Hand wheel consists of a wooden core with the heating coil wound spirally around it and over this is cast condensite under a pressure of 120 tons. All wiring is concealed, coming up the steering column between the rod and casing, while an ingenious commutator replaces the ordinary bushing at the top of the steering column, insuring constant electrical connection and preventing any twisting of the wires. Two quadrants of the wheel are heated, where the hands naturally fall on the rim in steering. A simple push switch is used to throw the current on and off, the red end of the button switching it off while the black turns it on. The current consumed is negligible and the device is made for cars with electrical systems of any voltage.

The Warm Hand wheels, as well as the ordinary types manufactured by the corporation, are furnished in folding form if desired. The folding wheels pivot on the diametrical crossbar, being firmly locked in place except when folded. A trigger-type lock operated by the forefinger renders manipulation easy. A button switch is provided for operating the horn.

The 18-in. Warm Hand steering wheel (model G) sells for $15 and in the folding design (model H) for $20.

Other products of the corporation are radiator filler caps, gasoline tank filler caps, control lever balls, moulded electrical installation and special composition moulding.—Pouvailsmith Corp., Poughkeepsie, N. Y.

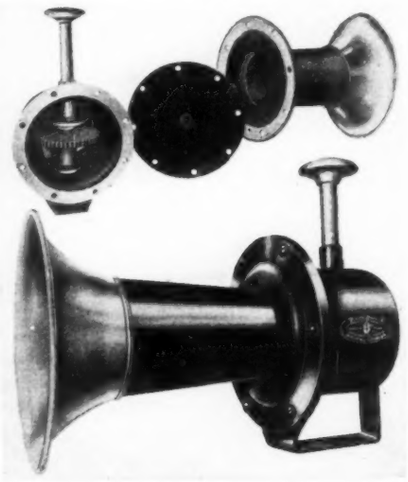




Folding type of Warm Hand steering wheel. Below, the rim construction is illustrated. Note heating coil in section

Evergood Horn for Trucks

This hand horn operates on the cut gear and spiral principle and is claimed never to stick, the slightest tap on the plunger being sufficient to emit a warning note. In testing this horn it was placed in a power press set to give the exact limit of stroke of the hand plunger and after being operated for approximately 60,000 strokes the horn was disassembled and micrometer measurements taken. This test the manufacturer states to be equal to two years use, the horn being in perfect operating condition at the finish and the wear being less than 1/1000 in. The standard finish of this horn, which is designed throughout for motor truck use, is baked black enamel for the projector and case while the bell and plunger are polished nickel. With a 5½-in. oval bell the price is $4, while the model with 6-in. oval bell lists at $5.—Emil Grossman Mfg. Co., Inc., Brooklyn, N. Y.



Evergood hand horn for trucks

Section through the National Redwall tire. Note the double breaker strip and the unusually thick, wide cushion

National Redwall Tire

The Redwall tire, illustrated in section herewith, adheres to standard modern tire construction, the manufacturers claiming no unusual features other than very high grade design, material and workmanship. The tires are built entirely by hand, square woven sea island duck fabric being used with one extra ply, while a double breaker strip is employed. The manufacturers claim that this construction practically eliminates the danger of stone bruises,. The cushion is built unusually thick and wide, extending under the tread down the side wall and well beyond any possible point of traction.

In the regular clincher and quick-detachable clincher styles, a fabric bead is used instead of the customary hard or soft rubber type, the manufacturers claiming that experience has proven the fabric bead to be practically unbreakable, even when the tire is driven flat. In the straight side type the bead consists of many strands of heavy piano wire embedded in fabric. The tread is made extra thick and very tough, the open steam wrapped tread process being used throughout. The red side wall and white tread make the tire's appearance attractive and give it the name Redwall. The tire is made in all types and sizes and with both plain and non-skid treads. It is guaranteed for 5000 miles.—National Rubber Co., Pottstown, Pa.

Indigan Fan Belting

This is a special fan belt stock, and the manufacturer is making a special campaign on belts adaptable particularly to the Ford engine. The new article is called Indigan fan belting, and is made from chrome grain leather. It is claimed by the maker that from the time this leather is started from the green hide the idea has been to produce a piece of material that will meet the conditions under which fan belts operate.

This concern also makes V-shaped fan belts, tire boots, laces for boots and hoods, crank pockets, metal hooks of various kinds, straps and round belting. —National Leather Mfg. Co., Niles, Mich.

The Automobile

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1915

PHENOMENAL is approximately the only word that adequately expresses the movement of the automobile industry during the year just closing. It has been a year unequaled in production, a year in which the basic principles of vehicle manufacture have received wider attention than heretofore, several companies rather than a few entering the production field. With some increased production meant self-preservation and with others it meant vastly increased profits. With such increased production, with such simplification of chassis design, prices would naturally be reduced.

While 1915 has been spectacular in results, more cars, simpler cars, better cars and lower prices, the reasons can only be found by analyzing 1914 and 1913. The roots of 1915 are found in the two or three previous years. Production has been facilitated by the standardizing work the S. A. E. has accomplished, and which has been going on for several years. Production has been possible by a greater fulfillment of the simplification in design, a movement which has been under way for three years. Simplification has been possible by better planning of makers, by more attention to motion study in manufacture and by bringing the engineering and production departments together so that a design was not used unless it were possible to incorporate in it sound engineering and easy production.

The Light, Large Car

JUST as the Cadillac eight ushered in an epoch so, it is probable has the new Marmon, in which light weight construction has been studied with such exceptional care. Of course the Marmon is not by any means the lighest seven-passenger car ever built, but it is far lighter than the average car of the class which it represents. It is from 20 to 30 per cent lighter, to descend to actual figures. A cut of between one-fifth and one-third in weight is no small accomplishment and it is difficult to see how it could have been done without the special frame design and the aluminum motor.

Whether this is so or not, there is little doubt but that the Marmon will spur on others to attempt the same result. Light weight is the greatest factor in reducing the expense of upkeep and so is of immense importance to the owner. Except in isolated instances the automobile engineer still has a tendency to disregard the weight of his production, but once his attention is forced upon it we may expect advances as rapid as we have seen before with other engineering problems.

Removing the Glare

MORE impetus must be given the movement of eliminating glaring headlights from our cities and country roads. Much has been done during the past year, but more remains, and what is left to be done must be actively taken up. The glaring headlight is an inexcusable danger on the highway. There is no necessity for it, because very simple anti-glare measures can be adopted by practically all motorists, that will not only eliminate the glare but leave the illumination of the headlight satisfactory so far as picking up objects along the side of the road and also distinguishing objects a sufficient distance ahead of the car.

Two or three States have already laws making the glaring headlight illegal, and other States will enact laws during the coming sessions of their legislatures. The motorists should assist in this rational legislation, using their influence to see that no insane regulations are included and that the law placed on the statute book is a just one. The rational motorist is as much opposed to the glaring headlight as any one. Its elimination is more conducive to safety. What must be avoided is any State placing its mark of approval on any particular type of anti-glare device. Such would be dangerous. It is possible to dim the glare without injuring the useful illumination, and it is to this point that motorists should see that only rational action is taken.

One important matter to be decided in this respect is whether many of the present signal lights incorporated in the headlights are really glare devices or not. The police in some cities are making arrests and imposing nominal fines on these signal lights, and at a recent demonstration of anti-glare devices in an eastern State it was the general feeling that several of these are really glare types and will have to be legislated against.

Chevrolet to Increase Stock

Financial Rumors Current That General Motors Will Merge with Chevrolet

NEW YORK CITY, Dec. 22—A meeting of the stockholders of the Chevrolet Motor Co. has been called for to-morrow in this city for the purpose of amending the certificate of incorporation of the company by increasing the capital stock and to authorize the issue of such increased capital. In October the Chevrolet capital was increased from $2,500,000 to $20,000,000. This stock is largely held by W. C. Durant and his associates, Durant being the organizer and dominating spirit in the Chevrolet organization.

It is rumored in financial circles that the increase of stock to be arranged for to-morrow is a step in a large movement to merge the General Motors Co. with the Chevrolet Motor Co. It is known that Mr. Durant and his associates representing the Du Pont powder and Remington arms interests has during the past year secured enough of the General Motors stock to have control of the organization and at the annual meeting of the General Motors held in November the board of directors was increased from fourteen to seventeen and nine new names added, only eight of the old board being retained. Among the new names added were Lammont Berlin, director of Aetna Explosives Co., Pierre Du Pont, and S. F. Prior of the Union Metallic Cartridge and Remington Arms Co. and A. H. Wiggin, C. S. Sabin, J. A. Haskell and some others, many representing the Durant interests.

100,000 Shares Involved?

Should a merger of General Motors with the Chevrolet Motor Co. be contemplated, it would call for a meeting of the stockholders of the General Motors Co. at which such action could be taken. The transfer, if made, would involve over 100,000 shares of General Motors stock which the Durant interests hold and which is sufficient to control the General Motors. At the present market price these shares are worth close to $50,000,000 and represent the holdings of Durant and the Du Pont and Remington interests. The General Motors Co. has an authorized capital of $60,000,000 of which $40,000,000 is common. Of the remaining $20,000,000 preferred only $15,000,000 is outstanding, and $16,500,000 of the common is outstanding.

Should such a merger take place it would be the outcome of the financing program of the General Motors Co., going back to the difficulties of 1910 when Eastern banking interests headed by Lee Higginson and J. W. Seligman agreed to purchase $23,000,000 of the company's five-year notes, thus advancing the General Motors sufficient cash for the payment of its debts and the building up of the business. These notes have been taken up, the last being redeemed during the past fall. During the life of the notes the General Motors stock was controlled by voting trustees until the dissolution of these last October. The object of this voting trust was to prevent any coterie of interest securing control of the stock and leaving the banking organizations without protection. With the dissolution of the voting trust it left any interest free to secure control of the stock.

May Exchange Stock

In connection with the rumor for merging the General Motors it is suggested in financial circles that the present increase of Chevrolet stock is needed to effect an exchange between Chevrolet and General Motors stock, various ratios of exchange being suggested.

Irrespective of whether these rumors are true or not the facts are that the influence of the Chevrolet interests are being rapidly increased and W. C. Durant is greatly increasing his hold on affairs.

—

$500,000 Co. to Take Over Overland Sales

TOLEDO, OHIO, Dec. 20—Willys-Overland, Inc., has been organized under the laws of Virginia with a capital of $500,000 to take over and handle the sales of the entire product of the Willys-Overland Co., this city, of which it is a subsidiary. All stock of Willys-Overland, Inc., will be owned by the Willys-Overland Co. and all officers and directors of the new corporation are from the official staff of the Willys-Overland Co.

—

Studebaker To Spend $1,000,000 To Increase Production

DETROIT, MICH., Dec. 16—To-day a three-day convention of the branch managers of the Studebaker Corp. ended here. Officials of the corporation announced the plans whereby at least $1,000,000 will be spent within the next few months to provide greater production facilities. Further additions and new buildings will be put up, among them a new drop-forge plant of at least double the size of the present one.

There were morning and afternoon sessions at which many matters of interest to the branch managers concerning the Studebaker business in general, were discussed. Talks were made by many of the officers of the company and other officials of the concern.

Reo 100% Stock Dividend

Capital Increased to $10,000,000 —Officers and Directors Re-elected

LANSING, MICH., Dec. 21—A stock dividend of 100 per cent was declared at the annual stockholders' meeting of the Reo Motor Car Co. this afternoon. The capital stock of the company was increased from $3,000,000 to $10,000,000. The directors were re-elected and they re-elected the present officers of the company as follows: President, R. E. Olds; secretary-treasurer, D. E. Bates.

Of the stock, $6,000,000 is issued, the balance of $4,000,000 remains in the treasury. The company has also paid cash dividends totalling 35 per cent this year.

Sales during ten months to the end of October totaled $16,658,698 and during that period 14,693 passenger cars were delivered. Arrangements are being completed to build up a large foreign business, which had not been attempted thus far.

The affairs of the Reo Motor Truck Co. are also in excellent shape, as announced at the stockholders' meeting. Sales totaled $2,613,208, as compared with $1,306,566 to the same time last year, 1480 trucks having been delivered. Sales for October to December were 611 trucks ahead of the corresponding period last year.

—

Lenox to Build 3-Tonners

BOSTON, MASS., Dec. 18—Officials of the Lenox Motor Car Co. are about to close negotiations with one of the big contractors who has an order from the Allies to build for it 500 or 1000 vehicles capable of carrying 3 tons. They will be built at Hyde Park, Lawrence and Fall River, the company having acquired recently factories in the two latter cities following its reorganization with a capital of $1,000,000.

—

General Electric in M. & A. M.

NEW YORK CITY, Dec. 21—The General Electric Co., Schenectady, N. Y., has joined the Motor & Accessory Manufacturers. This company is now making the Entz electric transmission system.

—

Burtsell Whitney Sales Manager

HARTFORD, CONN., Dec. 21—On Jan. 1, B. W. Burtsell, assistant factory manager of the Packard Motor Car Co., Detroit, will assume the position of sales manager of the Whitney Mfg. Co., this city.

$20,000,000 Merger Reported

Cole, Inter-State, Parker Parts, Auburn, Westcott and Others May Combine.

INDIANAPOLIS, IND., Dec. 16.—That a deal is pending in automobile circles involving the merger of some ten or twelve automobile and parts makers was confirmed to-day by C. P. Henderson, sales-manager of the Cole Motor Car Co. of this city. Although Mr. Henderson admitted that the Cole company was interested in the merger and would be one of the many companies merged into a huge combine, he would not give out any particulars, saying that final details had not been arranged.

It has been known for some time that such a consolidation was pending, but so secretly have the men behind the movement worked that it was only recently the information leaked out that several Indiana firms were interested. It is stated on good authority that the Inter-State Automobile Co., Parker Auto Parts Co., Auburn Automobile Co., Westcott Automobile Co. and several Indiana parts makers will go into the combine.

It is said that the actual capital represented in the merger will run into many millions, conservative estimates placing the mark at $30,000,000. Mr. Henderson said he believed the deal would be completed within a week. The report is that the merger will be capitalized at $20,000,000.

From Peru, Ind., comes the word that the Peru Auto Parts Co. of that city, has sent letters to its local stockholders offering to buy up the stock at $200 a share, which is double its par value, or to take them into the new company.

It is said in Peru manufacturing circles the Cole, Inter-State and Auburn are some of the concerns in the reorganization. Peru Auto Parts stock, which has a par value of $100 a share, yielded 85 per cent in recent years. The Peru stockholders have until Dec. 18 to decide whether they wish to retain their old stock and enter the new company, or take the two for one.

It is not stated what and where the other concerns that will enter the new corporation are, but it is reported in Peru that the plan of the new combine centers around Muncie, with Indianapolis and Auburn concerns taking part. The Peru Auto Parts Mfg. Co. was established in Peru six years ago, coming from New York. Since then the stock has paid 85 per cent in dividends.

A Meeting at Muncie

From Muncie, Ind., comes an authentic report that a meeting was held in that city last week, at which a large number of automobile companies were represented. It was reported at the time the conference was held that a combination was in process of formation, but no member of the conference would discuss the meeting. Among those who attended the meeting were the Ball brothers, who are back of the Inter-State company; Eugene Vatet, a Muncie capitalist; B. W. Twyman, formerly of Studebaker, but now with Inter-State; John J. Jean, who has a large foundry in Muncie and at Asbury, Mass.; A. L. Johnson and Roy Johnson, and representatives of the Motor Gear Co. and other concerns interested in the plan.

When interviewed none of the men would deny that a combination was on foot, but neither would any give out information.

—

Tax on Car Manufacturers Would Net $5,250,000

WASHINGTON, D. C., Dec. 18—Secretary of the Treasury in answer to a resolution adopted by the Senate regarding the estimated revenue should taxes be laid upon automobiles and tea, has sent to the Senate a report showing a tax of 25 cents per horsepower on motor cars, the tax to be paid by the manufacturers, would bring $5,250,000. Senator Gore was the author of the resolution seeking the information. It is understood that he will make use of it later when the question of raising further revenue for the government is before the Senate.

—

Timken-Detroit Axle Co. Makes Promotions and Appointments

DETROIT, MICH., Dec. 20—The Timken-Detroit Axle Co., has appointed J. C. Regan general factory manager. Mr. Regan, who has been during thirteen years with Yale & Towne, Stamford, Conn., was until recently assistant general superintendent of that concern.

W. L. Gleason, who has been assistant factory manager of the Timken company, has been promoted assistant to the vice-president in charge of manufacturing.

The Timken-David Brown Co., has appointed C. S. Dahlquist to the position of shop superintendent. Mr. Dahlquist was during the last four years chief engineer of the Lippard-Stewart Motor Car Co., Buffalo, and previous to this connection was with the Velie Motor Vehicle Co., and the International Harvester Co., being chief engineer of the latter's automobile division. Mr. Dahlquist will specialize on worm drive for motor trucks.

W. E. Taylor, a graduate engineer of Purdue University and recently with the Ross Gear Co., Lafayette, Ind., has joined the Timken-David Brown Co., in a selling and engineering service capacity.

White Capital to Be $16,000,000

New Company Organized—Large Interests Secured by New York Capitalists

CLEVELAND, OHIO, Dec. 18—The persistent rumors that the Morgan interests had purchased a substantial interest in the White company of this city, one of the pioneers in the automobile business, were set at rest to-day when it became known that New York interests represented by Chas. D. Barney & Co., and Montgomery, Clothier & Tyler of that city, secured a very substantial interest in the White company. It is not known whether the financial control will pass from the hands of the present White organization, or whether the Whites retain 51 per cent in the new organization to be known as the White Automobile Co., which is being organized under the laws of Ohio, with a capital stock of $16,000,000.

The new stock has not yet been listed on the stock exchange, but was all subscribed through the financial houses mentioned at $51 and is now selling on the New York curb at $53. The stock was all taken up, it is stated, in relatively small subscriptions.

No Change in Organization

Although Eastern financial interests will be represented on the board of directors of the new White Automobile Co., it is stated that the present organization with Windsor T. White, president and acting treasurer; Walter C. White, vice-president and sales manager; E. W. Hulet, vice-president and factory manager, and A. R. Warner, secretary, will be continued.

All of these officials will retain their present large holdings and will conduct the business as heretofore but their stock holdings will not bear the same relation to the complete stock issue as they have in the past. Present stock owners will hold the same amount of stock in the new organization they had in the old, plus the amount of new stock subscription they have procured.

It has been rumored for some time that there was too much inactive capital in the White organization due to the founder of the company Thomas H. White, who created the sewing machine business, and also his brother Henry White, both of whom died a year ago. These brothers had large holdings which are at present in the hands of trustees and executors which lend practically no assistance in the general work of the company. It is undoubtedly realized that additional Eastern capital will considerably broaden the interests of the organization, and bring influences to bear

which should be of material assistance in many ways.

The present White organization is capitalized at $8,000,000, made up of $5,000,000 common and $3,000,000 preferred. In the new company this has been doubled, the entire additional issue being common.

During the past year the White company has had phenomenal success, particularly in its truck department, which has been the largest truck producing organization in America.

The White company took up the manufacture of steam cars in 1889, their first car being completed and put on the road April 1, 1901. It was a new type of steam vehicle using the generator instead of the conventional boiler, basic patents on which were controlled by the White company. The manufacture of steam cars was continued steadily from April, 1901, to April, 1911, when the company took up the manufacture of gasoline cars adopting a French design of motor, the Delahaye, which was a pioneer in block cylinder construction as well as using a long stroke. This type of motor has been continued unchanged so far as its basic features are concerned from that date to the present. The company is now manufacturing two four-cylinder models having discontinued its six a year ago, excepting for custom orders.

—

Nelson Heads Miller-Lillich

FORT WAYNE, IND., Dec. 21—The Miller-Lillich Mfg. Co., which will build a factory in Fort Wayne in a short time for the manufacture of non-skid devices for automobiles, has elected the following officers for the coming year: T. O. Nelson, president; William Lillich, first vice-president, St. Louis; E. G. Reed, Fort Wayne, second vice-president; W. N. Ballou, Fort Wayne, secretary-treasurer and chairman of the board of directors. The officers with Harry Miller, St. Louis, the inventor, form the board of directors. The company is incorporated for $100,000.

October Exports $8,876,395

—

1596 Trucks Valued at $4,307,190 and 3479 Cars at $2,749,255

WASHINGTON, D. C., Dec. 18.—Tremendous gains continue to be made in the export trade in motor vehicles, according to figures announced today by the Departent of Commerce. During October last 1596 commercial cars, valued at $4,307,190; 3479 passenger cars, valued at $2,749,255, and parts, not including engines and tires, to the value of $1,819,950, were shipped abroad. During October a year ago the exports amounted to 672 commercial cars, valued at $2,286,964; 731 passenger cars, valued at $678,387, and parts, not including engines and tires, to the value of $404,360. The shipments during the nine months ended October, 1915, amounted to 18,865 commercial cars, valued at $52,076,406; 34,515 passenger cars, valued at $29,543,227, and parts, not including engines and tires, to the value of $12,814,809. During the same period of 1914 these exports were as follows: Commercial cars, 1309, valued at $3,353,509; passenger cars, 20,262, valued at $17,888,351; parts, not including engines and tires, $4,855,525.

2021 Cars to United Kingdom

The United Kingdom's imports of American cars in October last amounted to 2021 machines, valued at $2,730,468, as against 415 cars, valued at $829,982, imported during October a year ago. During the nine months' period these imports rose from 5545 cars, valued at $5,111,008, in 1914, to 21,455 cars, valued at $31,379,217, in 1915.

The shipments to France amounted to 298 cars, valued at $912,139, in October, 1915, as against 108 machines, valued at $171,049, shipped there in October a year ago, while during the nine months' period the shipments increased from 1152 machines, valued at $796,685, in 1914, to 5183 cars, valued at $13,038,767, in 1915.

There were no shipments to Germany either in October last or in October a year ago. During the nine months of this year four cars, valued at $2800, were shipped to that country, as against 1063 cars, valued at $799,552, shipped during the nine months' period of 1914.

Forty cars, valued at $25,887, were shipped to Italy during October last, while in October a year ago the number was two and the value $1450. During the nine months' period the shipments to Italy amounted to 233 cars, valued at $151,698, in 1914, and to 210 cars, valued at $134,901, in 1915.

814 Cars to "Other Europe"

Under the heading, Other Europe, 814 cars, valued at $1,920,176, were shipped to unnamed countries in October last, as against 346 cars, valued at $1,461,191, in October a year ago. These shipments amounted to 2736 cars, valued at $3,357,408, during the nine months of 1914, increasing to 7502 cars, valued at $20,003,140 during the same period of this year.

During October last 189 cars, valued at $202,552, were shipped into Canada, as against 127 cars, valued at $143,916, shipped there in October, 1914. For the nine months' period the official figures shows that 3981 cars, valued at $5,024,978, were shipped to Canada in 1914, increasing to 5238 cars, but with a decreased value to $4,154,137, in 1915.

Mexico's contribution was $12,250 for thirteen cars in October, 1914, while in October last it was only $8,200 for five cars. During the nine months' period the shipment amounted to seventy-three cars, value at $87,384, in 1914, and eighty-eight cars, valued at $84,141, in 1915.

The shipments to the West Indies and Bermuda amounted to 267 cars, valued at $173,355, in October last, and in October a year ago to seventy-two cars, valued at $51,792. During the nine months' period the exports increased from 466

Exports of Cars, Trucks and Parts for October and Eight Preceding Months

AUTOMOBILES

	October				Nine months ending October			
	1914		1915		1914		1915	
	Number	Value	Number	Value	Number	Value	Number	Value
Commercial	672	$2,286,964	1,596	$4,307,190	1,309	$3,353,509	18,865	$52,076,406
Passenger	731	678,387	3,479	2,749,255	20,262	17,888,351	34,515	29,543,227
Parts, not including engines and tires	.....	404,360	.....	1,819,950	.....	4,855,525	.....	12,814,809
Total	1,403	$3,369,711	5,075	$8,876,395	21,571	$26,097,385	53,380	$94,434,442
EXPORTS BY COUNTRIES IN OCTOBER								
France	108	$171,049	298	$912,139	1,152	$796,685	5,183	$13,038,767
Germany	.....	.....	.....	.....	1,063	799,552	4	2,800
Italy	2	1,450	40	25,887	233	151,698	210	134,901
United Kingdom	415	829,982	2,021	2,730,468	5,545	5,111,008	21,455	31,379,217
Other Europe	346	1,461,191	814	1,920,176	2,736	3,357,408	7,502	20,003,140
Canada	127	143,916	189	202,552	3,981	5,024,978	5,238	4,154,137
Mexico	5	8,200	13	12,250	73	87,384	88	84,141
West Indies and Bermuda	72	51,792	267	173,355	466	394,342	2,625	1,478,360
South America	48	33,242	383	210,840	963	775,504	2,464	1,277,326
British Oceania	190	169,582	447	360,260	3,075	2,619,212	3,594	3,041,852
Asia and other Oceania	63	71,956	295	284,063	1,295	1,240,336	3,245	5,474,001
Other countries	28	22,991	308	224,455	989	883,753	1,772	1,550,991
Total	1,404	$2,965,351	5,075	$7,056,445	21,571	$1,241,860	53,380	$81,619,633

cars, valued at $394,342, in 1914, to 2625 cars, valued at $1,478,360 for the corresponding period in 1915.

South America Gains

Our export trade with South America is growing steadily. During October last 383 cars, valued at $210,840, were shipped there, as against forty-eight cars, valued at $33,242, exported in October a year ago. During the nine months' period the exports increased from 963 cars, valued at $775,504, in 1914, to 2464 cars, valued at $1,277,326, in 1915.

British Oceania is also showing a fondness for America cars, the figures showing that 447 cars, valued at $360,260, were shipped there in October last, as against 190 cars, valued at $169,582, exported there in October a year ago. During the nine months' period the exports increased from 3075 cars, valued at $2,619,212, in 1914, to 3594 cars, valued at $3,041,852, in 1915.

Asia and Oceania Buy More

Asia and other Oceania took 295 cars, valued at $284,063, from this country in October last, as against sixty-three cars, valued at $71,956, in October a year ago. The shipments for the nine months' period increased from 1295 cars, valued at $1,240,336, in 1914, to 3245 cars, valued at $5,474,001, in 1915.

Shipments to other countries increased from twenty-eight cars, valued at $22,991, in October, 1914, to 308 cars, valued at $224,455, in October last, and from 989 cars, valued at $883,753, during the nine months of 1914, to 1772 cars, valued at $1,550,991, during the same period of this year.

The table appearing at the bottom of page 1158 shows the exports by countries in more complete detail.

Insurance Rates Lower

Underwriters Adopt New Rates Effective Jan. 1—To Cancel Policies

NEW YORK CITY, Dec. 17—Automobile insurance rates are lower. At a special meeting of the Automobile Underwriters' Conference new rates were adopted for the full form of policy to be effective on all policies attaching on and after Jan. 1, 1916. Existing policies are cancelled, for rewriting must be on a short rate basis only.

The following rules and qualifications were promulgated:

REDUCTIONS—Fifty cents allowed off Class A rates, 75 cents allowed off Class B and C rates, and $1 off Class D and E rates shown on schedule, for use of the Standard fire form of policy or the Conference form with the reduced rate of indorsement (excluding theft, valuation and automatic reinstatement clauses) attached.

ELECTRIC AUTOMOBILES—This and next year models, 1¼ per cent; last year, 1½ per cent; year before last, 1¾ per cent; three-year old, 2 per cent; older models, 2¼ per cent. Amounts at option of underwriter; minimum premium, $10. A reduction of ¼ per cent allowed for restricted form; minimum premium, $10.

DEALERS' AUTOMOBILES—On new gasoline and steam cars charge 2¼ per cent in column A, 2½ per cent in columns B and C, and 2¾ per cent for all others. On new electric cars charge 2 per cent for all models. On all second-hand cars 1 per cent additional rate must be charged. No rate cancellation allowed with a minimum charge of $1, except that the minimum charge on new cars listed at less than $1,200 shall be 50 cents. Amounts insured at option of underwriters. A reduction of ¼ per cent will be allowed for the attachment of the reduced rate indorsement, but in all cases the minimum charges of $1 and of 50 cents shall apply as above indicated.

NOTE—Automobiles in the hands of dealers may be written under the ordinary form of policy at rates provided for private pleasure was subject to cancellation on a short rate basis only, except pro rata cancellation may be allowed when a new policy is issued on the same car.

THEFT, FULL COVERAGE—For $15 additional premium, the indorsement provided for this purpose may be attached to the policy, giving protection against loss by theft for the full amount.

FIRE EXTINGUISHER ALLOWANCE—An allowance of 15 per cent may be granted from the premium obtained under all rates named in this schedule (except from the $15 additional charge for full theft coverage) for the attachment of the fire extinguisher indorsement as provided under conference rules.

PERSONAL EFFECTS CLAUSE—The policy may be extended to cover personal effects, a specific amount being insured, at the same rate as charge on the automobile. Theft, robbery and pilferage not covered.

ADDITIONAL BODIES—In determining the original list price of automobiles having more than one body the list price of the automobile equipped with the higher priced body shall be taken as the original list price. No change to be made in the classification of cars during the policy period. In the case of automobiles equipped with an extra body or bodies a specific amount must be applied to the chassis and equipment and to each body, the same rate being charged on the extra body or bodies as is charged on the automobile.

New Insurance Rates in Tabulated Form

*Original list price of automobile when new.	Class A. $3,500 and up.	Class B. $2,100 to $3,499	Class C. $1,200 to $2,099	Class D. $700 to $1,199	Class E. $699 and under
This year and next year models.	Insure for not to exceed actual cost.				
	$1.50	$1.75	$1.75	$2.00	$2.00
Last year models.	Insure for not more than				
	Amount of Ins. at option of Co.	80% of original list price.	70% of original list price.	60% of original list price.	60% of original list price.
	$1.75	$2.25	$2.50	$2.75	$3.00
Year before last models.	Insure for not more than				
	Amount of Ins. at option of Co.	50% of original list price.	50% of original list rpice.	40% of original list price.	40% of original list price.
	$2.25	$3.00	$3.25	$3.75	$4.00
Three-year-old models.	Insure for not more than				
	Amount of Ins. at option of Co.	40% of original list price.	40% of original list price.	30% of original list price.	30% of original list price.
	$3.25	$4.00	$4.25	$4.75	$5.00
Older models.	Insure for not more than				
	Amount of Ins. at option of Co.	30% of original list price.	30% of original list price.	30% of original list price.	30% of original list price.
	$5.00	$5.25	$5.25	$5.50	$6.00

*Excluding cost of additional equipment and extra bodies.
Minimum premium full form policy, $10. Restricted form, $5.

Snyder Resigns from Arbenz

CHILLICOTHE, OHIO, Dec. 21—C. O. Snyder, engineer and factory manager of the Arbenz Car Co., Chillicothe, Ohio, has resigned but has not announced his plans for the future.

Mr. Snyder was one of the pioneers in designing eight-cylinder motors in America, having built one in 1906.

Bates Is Re-Elected Chairman

LANSING, MICH., Dec. 16—Don E. Bates, secretary-treasurer of the Reo Motor Car Co., has been re-elected chairman of the Manufacturers' and Jobbers' division of the Lansing Chamber of Commerce.

S.A.E. Studies Army Requirements

Tactical Methods of Handling Supplies for a Division, Metropolitan Section Subject

NEW YORK CITY, Dec. 17—At a meeting of the Metropolitan Section of the Society of Automobile Engineers, held at the Automobile Club of America, Capt. Gordon Johnson, of the 11th Cavalry, U. S. Army, delivered a lecture on the requirements of army transport service.

Captain Johnson stated that it was not his idea to outline the specifications of an ideal track for army service, but on the other hand to point out the problems with which an army transport system has to deal in maintaining supplies and performing other necessary duties. In discussing the requirements of army service, Captain Johnson pointed out that the division is the tactical part of an army which must be considered in arranging for transportation. It consists of an entire unit in itself and has its independent baggage train. It was pointed out that the 15,000 men in such a division could march only 12½ miles per day and that in marching order, the division was weak and unprepared either for offense or defense. The task of feeding a division on a march was an enormous one and also that of deploying it into battle formation is another difficult task.

Captain Johnson in his address pointed out the importance of the transport system in maintaining the morale of the troops which is all important in creating the effectiveness necessary for a successful campaign.

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Detroit Auto Products Co. Formed

DETROIT, MICH., Dec. 17—Automobile parts and accessories on a large scale are to be made by the Detroit Auto Products Co., a new concern which has been incorporated and whose capital stock is temporarily $50,000. Those interested in the company are Joseph, Eugene and Leo Siegel, respectively secretary and general manager, treasurer and assistant general manager of the American Lady Corset Co., Detroit.

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Chalmers Starts Instruction School

DETROIT, MICH., Dec. 20—The Chalmers Motor Co., recently started an instruction school for the benefit of its employees, and, according to S. H. Humphrey, vice-president in charge of manufacturing, the initiative of the company is meeting with ready response among the 5000 men now employed.

The classes which are held in the new auditorium are under the direction of C. G. Arthur, a mechanical engineer and technical writer. They meet after the regular working hours, on Tuesday and on Friday, there being two sessions, one at 3.15 and the other at 5.30 p. m. At the first sessions the instruction consisted in lessons in reading blue prints, review work in mathematics, talks on general shop practice. Gradually the members will be made familiar with every step in the manufacture of a Chalmers car, so that they can be transferred from one department to another, with practical knowledge as to the work they will have to perform in the particular department.

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Packard Truck Sales Managers Find Business Booming

DETROIT, MICH., Dec. 15—Monday and Tuesday truck sales managers of the branches of the Packard Motor Car Co., met here at a convention held at the Packard plant. They reported that the year now ending was the best they ever had and that the outlook for 1916 is such that the demand for trucks and delivery cars will be greater than manufacturers anticipate. The scheduled output of Packard trucks for next year has already been largely contracted for and it will probably necessitate an increase in production over the number originally planned. The sales managers say that the demand for the trucks has been gradually increasing all through the land, and that it will continue stronger, as business men are realizing more and more that the truck or delivery car is the means of more business and saves them money.

It was announced by the Packard officials that, beginning this week, the first deliveries will be made of the two latest models known as the light duty models, respectively of 1 and 1½ tons.

Those in attendance were: Hartley Howard, Jr., Pittsburgh; F. A. Jones, Chicago; T. P. Myers, New York; H. S. Norton, Cleveland; G. E. Pagett, St. Louis; S. L. Prime, Boston; W. F. Roth, Philadelphia; C. C. Spencer, Detroit.

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Oakland Service Managers Meet

PONTIAC, MICH., Dec. 18—About seventy-five service managers from Oakland branches and agencies throughout the country, met at the plant of the Oakland Motor Car Co., here, this week, to become thoroughly acquainted with the new Oakland eight and the service policy of the company.

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W. C. Andrews Dies

NEW YORK CITY, Dec. 21—W. C. Andrews, advertising manager of the Edison Storage Battery Co., Orange, N. J., died suddenly yesterday.

Guayule Rubber Industry to Boom

Recognition of Carranza Government by United States Gives Confidence

TORREON, MEXICO, Dec. 17—If circumstances and outward indications count for much the guayule rubber industry is on the verge of the greatest boom in its history. Immediately following the announcement that the United States had recognized Carranza and his de facto government the American representatives of a number of large synidicates flocked into this part of the country and began purchasing leases on guayule producing land. Many such leases had already been entered into with the owners of the land while the latter were refugees in the United States. It is estimated that not less than 10,000,000 acres of land upon which the guayule shrub grows profusely have been leased to Americans during the last two weeks. The leases only cover the guayule shrub, and do not interfere in any manner with any other uses to which the owners of the land may want to put their respective properties. The guayule producing region is confined principally to the highlands of the States of Coahuila, Durango, Zacatecas and Nuevo Leon.

New Factories Planned

It is stated this rush to obtain leases on land for the use of the guayule shrub that grows thereon is preliminary to the establishment of a number of new rubber factories in this section. In fact, it is known that the building of two new factories of this character will soon be started in Torreon. In both instances the principal stock will be held by American automobile tire manufacturers, it is stated. T. F. Oberton of Detroit, Mich., and Frank Serrenth of Indianapolis, Ind., are here arranging for building the factories.

New Shrubs Grown

During the five years that the manufacture of guayule rubber has been greatly curtailed on account of the revolutionary disturbances the cut-over lands have grown a new supply of the shrubs and the raw material is now in greater abundance than it was at the beginning of the industry. This is due also to the fact that large tracts of land that were seeded with guayule when it was found that the shrub was valuable are now covered with a bountiful crop of the raw material.

Extensive Experiments

For several years the Intercontinental Rubber Co. had several expert American botanists in its employ for the special

purpose of devising the best means of propagating the guayule shrub. These scientists conducted their experiments on an extensive scale upon the Cedros hacienda and were successful in proving that the shrub could be successfully grown from the seed.

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200,000 Overlands for 1916

BOSTON, MASS., Dec. 20—There were 150 dealers affiliated with the Connell & McKone Co., Eastern Massachusetts distributors of the Overland and Willys-Knight cars present at the annual banquet of the organization here this evening at the Hotel Lenox. W. J. Connell presided. There were factory representatives present to explain things to the dealers about the increased production.

Joseph McDuffie, assistant sales manager, said that the factory contemplated an increase in production of from 45,000 cars in the 1915 season to at least 200,000 cars in 1916, and perhaps 225,000.

W. B. Sawyer, was introduced as the man who is to have charge of the New England zone to be established at Boston Jan. 1 next. It will be one of thirteen such zones.

Mr. Connell said there would be something very new given out at the New York show which would create as much of a sensation as the announcement made recently of the $615 cars. Just what it was he could not state, he said, but urged all the dealers to try to go to New York to be present when the announcement is made by Mr. Willys.

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Puritan Buys Cyclecar Service

DETROIT, MICH., Dec. 18—The Puritan Machine Co., this city, has purchased the complete service and repair parts of the Scripps-Booth Cycle Car Co. and these can now be obtained from the Puritan company. The purchase makes a total of seventy-one companies whose service and repair parts have been taken over by the Puritan concern.

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Locomobile Adopts Eisemann

NEW YORK CITY, Dec. 18—The Locomobile company, Bridgeport, Conn., has adopted type EMR6 dual Eisemann magneto and type DC Eisemann coil as standard equipment on its passenger cars, which will all be six-cylinder designs for the coming season.

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Detroit Gets New Freight Cars

DETROIT, MICH., Dec. 17—The first lot of the new automobile freight cars of which the Michigan Central railroad has ordered more than 2500, are expected here Dec. 25. Probably twenty-five a day will be added to the Detroit yards, and by the end of the month it is expected that there will be considerable relief of the congestion in this district.

Gasoline Prices Still Higher

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Unprecedented Demand with Scarcity of Supply Affects Rates in All Sections

NEW YORK CITY, Dec. 18—The Texas Co. to-day raised the price of gasoline to 21 cents a gallon wholesale and The Standard Oil Co. has followed suit with a 1-cent rise making the price to owners 21 cents a gallon. Consumers last May were paying 11 to 15 cents a gallon. Then prices rose gradually at the rate of about 1 cent a month.

The reason for the advance given by the oil companies is that the demand has exceeded the supply. Experts say 30,000,000 barrels will be consumed in the United States in 1916. There is an unusual shortage of crude oil from which to refine the gasoline, and hauling facilities for the crude product to the Eastern terminals are anything but the best.

General Advance in East

A general advance, following New York prices, has occurred in the East. All points in New York and Connecticut are on 21 cents a gallon basis; other New England States 22 cents. At Washington, D. C., and Alexandria, Va., the advance was 1½ cents, making present price 19½ cents.

Gasoline, tank wagon basis, has been advanced 1 cent at all stations in South Carolina. At Charleston, S. C., the price is now 21½ cents.

The Atlantic Refining Co. has advanced the price in Pittsburgh, tank wagon basis, 1 cent to 20 cents. The prices at the service stations range from 20 to 24 cents a gallon.

St. Louis gasoline is now quoting at 14.9 cents a gallon by both Standard Oil Co. and Independents. Denver prices have been raised 1 cent to 21, the highest there in two years.

Gasoline in Minneapolis has advanced at the filling stations to 16½ cents. This is a total of 6 cents since last summer. The last previous advance was Nov. 23. At Duluth the price is 20 cents. Last summer the price was 10 cents.

Gasoline in Texas took another leap, going from 19 to 21 cents, the highest price for gasoline in recent years. It is predicted by oil dealers that the price will go to 25 cents.

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Boom in Tampico Oil Fields

TAMPICO, MEXICO, Dec. 21—Industrial affairs and business conditions generally in Tampico and the adjacent oil fields are rapidly getting back to normal. American well drillers and other skilled laborers from the United States are flocking into the different oil camps in large numbers. New arrivals are coming in on every boat and train and there are already strong evidences of a revival of the oil boom that was in existence here when revolutionary events put a stop to development and promotion operations. New rigs for boring wells are being sent into the different oil fields daily and the work of exploitation will be in progress on an extensive scale within a few weeks. Much new tankage is being received and all of the tank farms in the vicinity of Tampico are to be enlarged.

The present steel storage tank facilities of the Tampico territory are approximately 18,000,000 barrels, and earthen tanks perhaps 2,000,000 barrels. It is said that the existing stocks are nearly equal to the storage capacity. If things go as well with the industry during the coming year as is now indicated the storage facilities of the producing districts and Tampico at the close of 1916 will probably be three times what they are to-day. Unless wonderful improvements and additions in transportation and marketing facilities are obtained meanwhile so that the product can be moved more promptly than in the past.

It is expected that with a further improvement of conditions here in the matter of pipe line and tank-steamer transportation the Pierce Oil Corp. will open its 30,000-barrel refinery at Vera Cruz. The plant has been closed for several years. It is also reported that the company will enlarge its refinery at Tampico during the coming year. The refining and asphalt plant of the Mexican Petroleum Co. at Ebano which was built in the early days of oil development in the Gulf coast region will be either greatly enlarged, it is said, or the Doheny interests which own it and the Huasteca Petroleum Co. will build a new plant of large capacity at Tampico. The Huasteca Petroleum Co., recently finished building a 10,000-barrel topping plant here, and the Standard Oil Co. of New Jersey began operating a new 4000-barrel plant of similar type in the suburb of La Barra. The new refinery of the Eagle Petroleum Co. at Tampico is also in operation. The same interests own the refinery at Minatitlan, on the Isthmus of Tehunatepec.

Among the larger companies that are said to have under consideration plans for the building of refineries at Tampico or in this vicinity are the East Coast Oil Co., which is understood to be owned by Southern Pacific interests; the Corona Petroleum Co., a subsidiary of the Dutch-Shell Trading and Transport Co., the Penn-Mex Fuel Co., the Magnolia Petroleum Co., The Texas Co., the Gul-Refining Co., and the Mexican Oil Co. Most of these companies have large quantities of oil in storage here at this time.

Briscoe Capital to Be $6,000,000

Swift Interests Behind New Co.—Lewis Plant Bought—30,000 Cars Planned

JACKSON, MICH., Dec. 17—Final arrangements for the reorganization of the Briscoe Motor Co. and its affiliated concern, the Argo Motor Co., both of this city, were made to-day whereby the Swift interests of Chicago are to back the greatly enlarged organization originally brought to this city by Benjamin Briscoe and his associates. The deal means an increase in the capital stock of the Briscoe Motor Co. to $6,000,000, of which $4,500,000 is common and the balance preferred.

Coincident with the perfecting of this enlargement, it becomes known that the large and modern plants of the Lewis Spring & Axle Co. here have been bought by the Briscoe combination, as well as some of the equipment in them. These plants have been occupied in the production by the Lewis concern of the Hollier eight, but the purchase does not mean that Lewis will go out of business. On the contrary, the plant at Chelsea, Mich., which Lewis bought in August, will be used for the making of the Hollier eight, according to Fred Lewis. This is the old Flanders plant and is a large four-story structure. It has been fully equipped with all the necessary machinery and equipment by the Lewis company and has been in operation for some time. Its production capacity is 20,000 cars or more.

Some time ago this movement of providing greater production facilities was begun by the Briscoe concerns, and as was reported in THE AUTOMOBILE for Nov. 11, the Jackson Motor Parts Co. was formed with a capital of $200,000 to make parts for Argo and Briscoe cars. More recently, the machinery and equipment of the new defunct Mason Motor Car Co., Waterloo, Iowa, was bought and has been brought to Jackson for installation in the motor parts plant. The plant of the Jackson Metal Products Co. has also been taken over to give added production facilities.

Benjamin Briscoe is still the head of the reorganized company; Frank Briscoe, who only recently became general manager of the old company, appears in the new as vice-president in charge of manufacturing; L. E. Wilson of Chicago, who recently became associated with the Briscoe concern as general manager, has the title of vice-president in charge of sales and advertising in the new combination.

The result of all these added production facilities is said to be a schedule of 30,000 cars for the first year, of which 5000 are to be light deliveries, 10,000 the present models, and 15,000 a new four-cylinder design at low price.

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Market Prices Higher

NEW YORK CITY, Dec. 21—With the exception of a 2-cent drop in aluminum, market prices last week were higher. Copper, both electrolytic and lake, went up to 20 cents a pound and tin closed yesterday at $40 per 100 lb., just $2.25 higher than the opening price on Tuesday. Steel prices remained constant throughout the week.

Gasoline prices last week resumed their upward movement with the fuel growing scarcer each day.

Fine up-river Para again went up, reaching 77 cents yesterday. It is expected that the high price of rubber in all grades will have a material effect in a general rise in tire prices in the near future.

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National Acme Mfg. Co. to Increase Capital $6,500,000

CLEVELAND, OHIO, Dec. 20—Stockholders of the National Acme Mfg. Co. have received notice of a prospective increase in the capital stock from $2,500,000 to $9,000,000.

This increase is said to presage the consolidation of the Windsor Machine Co. of Windsor, Vt., with the National Acme Mfg. Co., which would require approximately $3,500,000, but this deal at the present time is only in the tentative state.

Should the present plans go through the company's stock will consist of $1,500,000 of 6 per cent preferred stock and $7,500,000 common stock. A portion of each issue would be sold to provide funds to take care of the purchase of the Vermont company.

The National Acme Mfg. Co., among other things, manufactures machine tools and automobile and electrical parts.

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Ajax Rubber Co. Formed with $5,000,000 Capital

TRENTON, N. J., Dec. 18—To refinance and increase its output the Ajax Rubber Co. has been incorporated with a capital of $5,000,000, of which $3,000,000 will be issued. The par value of the stock is $50 a share. The new company will take over the business and good will of the Ajax-Grieb Rubber Co. and the stock of the latter company canceled is acquired by the new company. The stock has been underwritten at $65 a share.

A new plant, 200 by 350 ft., three stories, is at present being built. The foundations will permit the building of three additional stories.

Beginning with a cash capital of $18,500, to which no future cash investment was added, except the sum of $100,000 during the year 1911, the present net assets of over $2,000,000 represent an accumulation of surplus profits after payment of dividends. The net earnings for the last four fiscal years ended Aug. 31, 1915, averaged over $430,000 per annum, equivalent to over 14 per cent on a par value of $3,000,000. The purpose of the present financing is to retire all the outstanding preferred stock of the Ajax-Grieb Rubber Co., and to finance the contemplated extension of its factories, which will materially increase its output.

The net sales, it is predicted, for the current year based on actual earnings of 3½ months and contracts closed should approximate $750,000, or 25 per cent on the $3,000,000 stock to be issued.

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Hercules Elects Directors

CANTON, OHIO, Dec. 16—Following the organization of the Hercules Motor Mfg. Co. last week, it has been announced that operations will be started in February. At a meeting of those interested in the plant, the following directors were elected: H. H. Timken, J. G. Obermier and O. J. Strayer, of Canton; G. M. Mather, of Cleveland; L. Pulcher of Detroit, and Charles Balough of Springfield.

After the election of directors Charles

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat	Mon.	Week's Ch'ge
Aluminum	.58	.58	.58	.58	.58	.56	—.02
Antimony	.38½	.38½	.38	.38	.38	.38	—.00½
Beams and Channels, 100 lb.	1.97	1.97	1.97	1.97	1.97	1.97	...
Bessemer Steel, ton	30.00	30.00	30.00	30.00	30.00	30.00	...
Copper, Elec., lb.	.19½	.19½	.19½	.19½	.19½	.20	+.00½
Copper, Lake, lb.	.19½	.19½	.19½	.19½	.19½	.20	+.00½
Cottonseed Oil, bbl.	8.34	8.34	8.35	8.35	8.35	8.60	+.26
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.28	...
Fish Oil, Menhaden, Brown	.48	.48	.48	.48	.48	.48	...
Gasoline, Auto, bbl.	.20	.20	.20	.20	.20	.21	+.01
Lard Oil, prime	.92	.92	.92	.92	.92	.92	...
Lead, 100 lb.	5.40	5.40	5.40	5.40	5.40	5.40	...
Linseed Oil	.61	.61	.61	.61	.61	.62	+.01
Open-Hearth Steel, ton	31.00	31.00	31.00	31.00	31.00	31.00	...
Petroleum, bbl., Kansas, crude	1.20	1.20	1.20	1.20	1.20	1.20	...
Petroleum, bbl., Pennsylvania, crude	2.10	2.10	2.10	2.15	2.15	2.15	+.05
Rapeseed Oil, refined	.88	.88	.88	.88	.90	.90	+.02
Rubber, Fine Up-River, Para	.72	.73	.74½	.74½	.75	.77	+.05
Silk, raw, Italian	...	...	5.25	...	...	5.25	...
Silk, raw, Japan	...	...	4.70	...	...	4.65	—.05
Sulphuric Acid, 60 Baume	1.00	1.00	1.00	1.00	1.00	1.00	...
Tin, 100 lb.	37.75	37.75	38.50	38.50	38.50	40.00	+2.25
Tire Scrap	.05½	.05½	.05½	.05½	.05½	.05½	...

Balough was elected president; Gordon Mather was elected vice-president and O. J. Strayer, secretary and treasurer.

The location of the plant will be near the Aultman group and 5 acres of ground have been purchased. The first building will cost $75,000. The building will be 65 by 400 ft. of reinforced concrete and two stories high. New machinery will cost over $75,000.

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Gier & Dail Capital $500,000

LANSING, MICH., Dec. 16—The Gier & Dail Mfg. Co., manufacturer of sheet metal stampings has increased its capital stock from $300,000 to $500,000 of which $400,000 is paid in, and will soon begin making automobile bodies, besides increasing the production of its other lines. A new plant is to be put up for the body department. W. K. Prudden is president of the company; Harry E. Bradner, vice-president; B. S. Gier, secretary and manager, and H. F. Harper, treasurer.

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Franklin Capital Now $2,600,000

ALBANY, N. Y., Dec. 15—The H. H. Franklin Mfg. Co., Syracuse, has increased its capital from $1,500,000 to $2,600,000.

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Dividends Declared

Electric Storage Battery Co.; 1 per cent from net earnings on both common and preferred, payable Jan. 3, to holders of Dec. 21.

Firestone Tire & Rubber Co.; quarterly of 1¾ per cent on preferred and 5 per cent on common, payable Jan. 15.

Security Prices Lower

General Motors Drops 37 Points—Packard Features with 25-Point Rise

NEW YORK CITY, Dec. 21—Automobile and accessory securities were dull and lower in price last week, a number of the prominent issues showing losses. A reaction set in on a number of the stocks which heretofore have shown strength on the exchange. General Motors broke around the latter part of the week, said to be due to a readjustment of the price at which it has been carried in banking loans. The closing price yesterday was 501, just 37 points under last Monday's price. Chevrolet dropped 10 points and the new White stock went down 58 points. The New York Curb Market Assn. has approved for temporary quotation and trading 320,000 capital shares of the White stock, par value $50, to be traded in when-as-and-if-issued.

Notwithstanding the general dullness of the market, several of the issues showed considerable strength. Packard common went up 25 points and closed yesterday at 175. Studebaker common showed a gain of 3 points. This stock went up on heavy buying on Wednesday and while speculative attention centered upon it the stock was nevertheless very strong, but when another stock came to the fore, the rise petered out. What happened to Studebaker was typical of the whole market and revealed its professional character. Willys-Overland common rose 5 points. A preliminary estimate of the Overland earnings for the fiscal year show net profits around $15,000,000, a figure which would equal better than 65 per cent on the present $21,000,000 of common stock after taking out the 7 per cent dividend on the $15,000,000 preferred.

Issues on the Detroit Exchange were in sympathy with the local markets. General Motors went down 25 points and Paige dropped 15 points. Packard featured the market with a 32-point rise, the closing on Saturday being 184.

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Akron Rubber Co.'s to Pay $800,000 in Dividends

AKRON, OHIO, Dec. 18—Payments of dividends announced by the large rubber companies of Akron, Ohio, will total more than $800,000 Jan. 1. It is believed that about half of the amount will be paid to stockholders living in Akron.

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Lee Tire Incorporated for $750,000

ALBANY, N. Y., Dec. 16—The Lee Tire & Rubber Corp., has incorporated with a capital of $750,000. The directors are R. E. Corcoran, Brooklyn; Edward Roeder, Ridgefield Park, N. J., and James Gru, Brooklyn.

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H. A. Lozier Co. Incorporated

CLEVELAND, OHIO, Dec. 20—The H. A. Lozier Co. has been incorporated with a capital of $10,000 to manufacture and deal in automobiles. The incorporators are: H. A. Lozier, A. W. Foote, E. G. Tillotson, Frank G. Ginn and R. B. Sheridan.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
†Ajax Rubber Co.	..	..	69	69½	..
Aluminum Castings pfd.	95	100	..	..	..
J. I. Case pfd.	..	..	83¼	88¼	—4¼
Chalmers Motor Co. com.	..	90	150	160	..
Chalmers Motor Co. pfd.	87½	92½	100	103	—1
Chevrolet Motor Co.	..	..	136	137	—10
Electric Storage Battery Co.	..	..	64	66	—4
Firestone Tire & Rubber Co. com.	350	360	690	705	..
Firestone Tire & Rubber Co. pfd.	110	111	112	..	..
General Motors Co. com.	79	83	501	510	—37
General Motors Co. pfd.	90⅜	95	120¼	121	—8¼
B. F. Goodrich Co. com.	24¼	25	72½	73	+ ½
B. F. Goodrich Co. pfd.	93½	96	113½	114	+ ½
Goodyear Tire & Rubber Co. com.	188	191	336	339	+2
Goodyear Tire & Rubber Co. pfd.	100	102	113	114	..
Gray & Davis, Inc., pfd.	..	..	..	..	..
International Motor Co. com.	..	..	30	33	..
International Motor Co. pfd.	..	..	50	60	—5
Kelly-Springfield Tire Co. com.	65	68	*290 † 72	300 74	—5 —2
Kelly-Springfield Tire Co. 1st pfd.	79	80	95	98	—3
Kelly-Springfield Tire Co. 2d pfd.	95	97	†72	74	—3
Maxwell Motor Co. com.	14½	15	75¼	75¾	+ ¼
Maxwell Motor Co. 1st pfd.	43½	45	101½	101¾	+1½
Maxwell Motor Co. 2d pfd.	17	19	55¼	56	+ ¼
Miller Rubber Co. com.	..	..	235	243	..
Miller Rubber Co. pfd.	..	..	110	111	..
New Departure Mfg. Co. com.	..	..	..	..	..
New Departure Mfg. Co. pfd.	..	..	..	..	..
Packard Motor Car Co. com.	..	100	175	200	+25
Packard Motor Car Co. pfd.	90	..	100	102	+1
Paige-Detroit Motor Car.	..	..	..	725	..
Peerless Motor & Truck Corp.	..	..	38½	39½	+2¼
Portage Rubber Co. com.	25	30	60	65	..
Portage Rubber Co. pfd.	80	85	99	100½	— ½
Regal Motor Co. pfd.	..	..	18	22	..
‡Reo Motor Truck Co.	10½	11½	21½	..	..
‡Reo Motor Car Co.	21¼	22½	54	57	..
Solitdorf Electric Co. pfd.	..	..	..	..	..

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Stewart-Warner Speed. Corp. com.	51½	53	86	87	—1
Stewart-Warner Speed. Corp. pfd.	98½	101	108	..	..
Studebaker Corp. com.	32½	33	168	168½	+3
Studebaker Corp. pfd.	86½	88	111	113½	—3
Swinehart Tire & Rubber Co.	69	71	85	86	..
Texas Company	..	..	230¾	231	+17¾
U. S. Rubber Co. com.	52½	53½	54	54⅜	+1
U. S. Rubber 1st pfd.	101½	102¼	107½	108½	— ½
Vacuum Oil Co.	..	..	238	242	+12
White Motor Co. (new).	..	..	52	52½	—58
Willys-Overland Co. com.	83	85	243	245	+5
Willys-Overland Co. pfd.	90	95	114¾	115	+ ¼

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

Chalmers Motor Co. com.	..	88	..	158	—2
Chalmers Motor Co. pfd.	87½	92½	..	102½	—1½
Continental Motor Co. com.	155	180	248	257	..
Continental Motor Co. pfd.	..	75	92	..	..
Ford Motor Co. of Canada, Ltd.	..	..	400	425	..
General Motors Co. com.	85	86	490	510	—25
General Motors Co. pfd.	89	91	119	121	—4½
Maxwell Motor Co. com.	13¾	14½	75	77½	+1¼
Maxwell Motor Co. 1st pfd.	43	46	100	102	+1¼
Maxwell Motor Co. 2d pfd.	16	18	55	57	+1
Packard Motor Car Co. com.	..	100	184	..	+32
Packard Motor Car Co. pfd.	90	..	102½	..	+2
Paige-Detroit Motor Car Co.	..	..	..	720	—15
‡Reo Motor Car Co.	21¾	22¼	58	60	+4
‡Reo Motor Truck Co.	10½	11½	..	23⅛	+ ⅜
Studebaker Corp. com.	..	..	168	171	+4
Studebaker Corp. pfd.	..	..	113	115½	—1½

INACTIVE STOCKS

‡Atlas Drop Forge Co.	..	25	28½	31	..
Kelsey Wheel Co.	185	..	265	..	..
‡W. K. Prudden Co.	..	20	24½	27	..
Regal Motor Co. pfd.	..	25	..	22½	.

*Old. †New. ‡Par value $10.

No Tire Famine in France

Manufacturers' Difficulty Is Irregular Delivery of Materials —Metric Sizes Used

PARIS, Dec. 10—While there is nothing approaching a tire famine in France, manufacturers are meeting with unusual difficulties in keeping their establishments running regularly. Raw rubber is obtainable in as big quantities as can be desired, but the various materials and compounds required in tire manufacture are delivered in a very irregular manner. First one material, then another, is found to be short, or to have been delayed in transportation, thus throwing departments or even the whole factory out of gear.

"We have always managed to make good on deliveries," declared the head of a leading factory in France, "but so many unexpected difficulties crop up every day that the life of a tire manufacturer is full of trouble. At one time it looked as if we might be held for lack of coal; that difficulty was overcome, and we now hold stocks for some months ahead. Benzol can only be obtained through the government, and as supplies are given out very economically, any delay in delivery is liable to put a factory out of gear. We have been able to deliver all the stocks of tires that the armies could possibly use, but it has been a more difficult task to keep the factories running regularly than the public has any idea of.

"According to a neutral tire manufacturer who has been able to make a trip into Germany, the most rigid economy is being exercised in that country, and by reason of this and the huge reserve supplies laid in before the outbreak of war, the Germans expect to keep going two years more before their tire supply fails entirely."

Inch Sizes Abolished

The use of inch size pneumatic tires in the French army has been entirely abolished. Some time ago the Jeffery company received a big order for ¾-ton chassis to be used as ambulances, and equipped with twin and single pneumatic tires. All these were delivered with millimeter size rims, to take French size tires. Trucks are being delivered with solid tires in inch sizes, but whenever replacements are needed, conversion is made to millimeter sizes. A sufficient stock of spare wheels is kept on hand so that changes can be made without holding the truck out of service; the wheels taken off are sent to have their rims transformed and when fitted with the millimeter size tires are used on the next set of trucks coming in for re-tiring.

The demountable solid tire has been received in France with a certain amount of suspicion. However, it is being given a genuine test on Pierce and Packard trucks, and up to the present no serious fault has been brought against it.

Manufacturers in France are not able to handle much private business, owing to the difficulty in getting labor and supplies for more than army requirements. There is a demand for tires, and some makers would like to meet it, for they state that it would be more profitable than fulfilling army contracts. Since the outbreak of war the price paid by the army has decreased, owing to a cut by one of the leading French manufacturers. As the cost of all raw material has increased enormously, army contracts are no longer money making propositions. The leading maker of solid tires is now Bergougnan; Michelin is the biggest single maker of pneumatics, and is making this type of tire only. Goodrich is manufacturing pneumatics and solid tires, and is importing also; the French Dunlop factory is not making tires, but the English factory of this company is running strong. Pirelli is importing some tires from Italy into France. The United States Rubber Co. has a representative in France at present and is investigating the market. It is declared by the French trade that the high duty on American tires makes it impossible for any American firm to sell tires profitably in France.

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Hillclimb Event for Pike's Peak in Sept.

NEW YORK CITY, Dec. 20—A hillclimb will be held over the Pike's Peak highway next September. Up to September last, only 12,000 ft. above sea level of the roadway was completed. The road has since been completed right to the top.

The hillclimb will be for cars of every class, both touring and special, and also for motor trucks, both with and without loads. A trophy for the free-for-all contest will be of Cripple Creek gold and will be a replica of Pike's Peak in solid gold with a roadway which will be a duplicate of the Pike's Peak way leading to the top.

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Motometer Adds Midget Model

NEW YORK CITY, Dec. 21—The Motometer Co., this city, is placing on the market a new model Moto-Meter, styled the Midget which is to sell for $2.50. Except that it is smaller in diameter than the two existing models and measures 2¼ in. as compared with 3¼ for the others it is exactly similar in principle and practically the same in construction. Like the Junior model, it has no glass over the thermometer scale. It is inserted through a ⅞-in. hole in the radiator cap and bolted in place.

Paris Fuel Shortage Hits Taxis

Army Supply Adequate But Private Motorists Buy ½ Gal. at a Time

PARIS, Dec. 9—Owing to the gasoline shortage the Paris taxicab service has been disorganized and friction has arisen among the public, taxicab drivers and the municipal authorities. The shortage is only relative. Supplies are coming through in sufficient quantity and with sufficient regularity to satisfy all the requirements of the army. But the same does not apply to supplies for civilians, and for reasons which are variously attributed to actual shortage, lack of cans, and absence of river tank steamers, the private motorists of Paris have been reduced to buying gasoline in quantities of ½ gal. at a time. The persons most severely affected are taxicab drivers. Before the war these men obtained gasoline and benzol from their own co-operative supply societies. Benzol has been taken off the market in order to make explosives. The co-operative societies have had great difficulty in getting supplies of gasoline, and the ordinary dealers and garage proprietors who are living on a day-to-day supply, are not at all anxious to receive taxicab drivers as temporary clients. The situation has thus arisen of taxicab drivers being unable to get fuel, or obtaining it in such small quantities that they cannot remain on the streets as long as usual. As the motor bus service of Paris has been suspended since the first day of the war, and as electric trolley cars never have been very plentiful in the central parts of the city, the general public is seriously inconvenienced by the reduction of the number of cabs.

Drivers' Supply Limited

A few of the big taxicab companies now sell their drivers 2.6 gal. of gasoline per day for $1; the men have to pay 40 cents city tax to take this amount of gasoline into Paris. To buy in the open market, this quantity of gasoline would cost $1.20, plus city tax. As 2.6 gal. of gasoline are not sufficient for a full day's work, the drivers working for the big companies prefer to return to the garage as soon as they have used up this amount, rather than buy an extra supply from the dealers or garages. In consequence it has become a very difficult matter to get a taxicab in Paris after 9 o'clock in the evening. The theatrical profession, restaurant proprietors and the general public are angered at the shortage of taxis and have appealed to the chief of police, who has reluctantly had to admit that he has no power to make drivers

stay on the streets longer than they desire. Most of the men would be willing to stay out if they could get extra pay after 9 o'clock, but the public who do not understand the details of the case consider that they are being cheated if the driver does not operate at the normal tariff indicated on his instrument.

It has to be admitted that the taxicab driver's lot is not a happy one. Before the war he could buy unlimited quantities of benzol at 23 cents a gallon. Now, if he belongs to one of the big companies he can buy a limited supply of gasoline at 38 cents a gallon, while if he runs his own cab, or belongs to one of the smaller companies, he has to pay from 40 to 45 cents a gallon. In addition to this he has to pay a local tax of approximately 3 cents per gallon on benzol and 4 cents per gallon on gasoline taken into the city of Paris. In other words drivers are using gasoline at 49 cents a gallon where they were formerly running on benzol at 26 cents a gallon. Calculating on a consumption of 5 gal. per day, the extra cost to the driver is $1.15. As the men buy their own fuel and take a percentage of the total earnings of the cab, all the extra cost of operation comes out of their pockets.

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25,254 Fords in Kansas

TOPEKA, KAN., Dec. 18—Over one-third of the cars in Kansas are Fords, 25,254 out of 61,000 cars being of this make. Sedgwick County, with 1131 cars leads in number, while Grant County is at the bottom, with but eleven. The average to a county is about 1340. March 1 there were 61,000 cars listed for taxaxtion, but at present more than 70,000 cars have been licensed.

The list of automobiles in the State by makes includes:

Auburn	652
Buick	5,998
Cadillac	855
Chalmers	732
Dodge	551
E. M. F.	699
Ford	25,254
Hudson	879
Hupmobile	755
Jackson	512
Maxwell	3,026
Mitchell	707
Oakland	720
Overland	5,115
Regal	523
Reo	2,389
Saxon	378
Studebaker	3,427
Velie	406

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Ford Gains 66 2/3 Per Cent

DETROIT, MICH., Dec. 17—During the first four months of the fiscal year of the Ford Motor Co., that is from August to the end of November, the production and sales were approximately 66 2/3 per cent larger than during the similar period in 1914, when, according to figures then furnished by the Ford company, 76,906 cars were made and sold.

$13,140,000 Upkeep in Kansas

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73,000 Cars Cost Owners That Total Annually—Car Value $75,000,000

TOPEKA, KAN., Dec. 18—C. W. Myers, head of the State Motor Car License Department, has just compiled a set of figures showing that Kansas owners expend $13,140,000 a year on the maintenance and upkeep of their cars. His figures are based on the license record, showing ownership of 73,000 cars, exclusive of those in the hands of the dealers, within the State.

Mr. Myers has taken an average of $15 a month as the upkeep cost and thus worked out his findings. It shows a cost of $180 a year a car, divided equally between gasoline and oil, tires and accessories and labor and repairing. The value of the Kansas owned cars is given at $75,000,000.

"The motor not only has converted blacksmith shops into garages, but also has driven the old-fashioned livery stables out of business," Mr. Myers explained. "Rarely indeed now can a livery stable be found in the small towns, and they are getting scarce in the larger places. For instance, Topeka has only two now, whereas a few years ago there were a dozen or more. The jitney, the bus and the truck have absorbed the livery field."

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To Handle Madison Car and Batavia Tire in Mich.

DETROIT, MICH., Dec. 20—A new company, known as the Madison Motor Sales & Service Co. has been organized, with W. D. Block as president, to handle the State of Michigan for Madison cars and Batavia tires. Quarters have been taken at 1425 Woodward Avenue, Detroit, Mich.

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Huff Laboratories, Inc., Formed

DETROIT, MICH., Dec. 17—The Huff Laboratories, Inc., has been incorporated with a capital stock of $20,000. Its headquarters are in the Garfield Building, here. Those interested are E. S. Huff, formerly of the research department of the Maxwell Motor Co.; H. L. Cunningham, of the Cunningham Auto Co., and Orvice La Bounty. The corporation will do general research work.

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Newmark Writes a Book

DETROIT, MICH., Dec. 17—J. H. Newmark, former advertising manager of the Oakland Motor Car Co., Pontiac, Mich., and now with the Apperson Bros. Automobile Co., Kokomo, Ind., in a similar capacity, has written a book entitled Automobile Business: A Guide, which comes as the result of his varied experience in the sales and advertising fields. In his introduction Mr. Newmark points out that the book is for those who are already engaged in the automobile business, or who are thinking of entering this field of activity in any capacity, either as dealer, salesman, in garage work, or the business as a whole. Helpful inspiration and suggestion of better ways of doing business are the basis on which the writer attacks his problem. The publisher is the Automobile Publishing Co., Detroit.

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New $110,000 Automobile Building for Boston

BOSTON, MASS., Dec. 20—Ground was broken this week for the erection of a new building at 683 Beacon Street, near the junction of Commonwealth Avenue, to be occupied by the Oakland Motor Car Co., Pennsylvania Tire & Rubber Co., and the John L. Judd Co., agent for Lewis VI, Allen and Auburn cars. The structure will be ready in April and will cost about $110,000. It will be three stories and basement of reinforced concrete, with all the modern devices for motor and tire business. It will be close by the Marmon, Hupmobile, Reo, Pathfiender, Regal, Peerless, Maxwell, Hudson, King and Autocar buildings.

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N. A. C. C. Banquet Jan. 4

NEW YORK CITY, Dec. 22—The annual banquet of the National Automobile Chamber of Commerce, Inc., will be held Jan. 4 during show week at the Waldorf-Astoria.

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M. & A. M. Banquet Jan. 5

NEW YORK CITY, Dec. 20—The Motor and Accessory Manufacturers has announced the date for the eighth annual banquet of the accessory organization. The affair which promises to excel its predecessors will be held on Wednesday evening, Jan. 5 at the Waldorf-Astoria.

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Mt. Pleasant Co. May Move

MT. PLEASANT, MICH., Dec. 16—The Mt. Pleasant Motor Car Co., which was organized here in 1914, and which has been making the M.P. four- and eight-cylinder cars, is negotiating to remove either to Saginaw, Alma or some other city where a plant and other manufacturing facilities will be offered. Representatives of the Board of Commerce of Saginaw, were here and made some attractive propositions to have the company locate in that city, it is said.

Breaks Non-Motor-Stop Record

Maxwell at End of 672 Hr. Goes 14,261.7 Miles—21.2 M. P. H. and 22.3 M. P. G.

LOS ANGELES, CAL., Dec. 20—Stock Maxwell under A. A. A. sanction number 888, breaks world's non-motor-stop record at end of 672 hr. with a total mileage of 14,261.7 miles. The run started Nov. 22, with an average of 21.2 m.p.h., and 22.3 miles to a gallon of gasoline. Former record to be raised to 20,000 miles if motor which is now running in perfect shape can be kept running.

Chicago Fender Law Invalid

CHICAGO, ILL., Dec. 21—The Corporation Counsel of the city of Chicago told the city council that the ordinance requiring fenders on motor trucks is invalid. For several months the council has been urging the enforcement of the ordinance, which has been opposed by the Illinois Manufacturers' Association, the Chicago Automobile Trade Association, and other organizations.

It was pointed out to the general superintendent of police that the ordinance was clearly invalid because it contained a delegation of power that could not be sustained by the court.

In the law department it was found that no type or types of fenders could be definitely described for use, and the only course left was to provide by ordinance for a standard type arrived at by uniform tests. The committee will take up the preparation of a new ordinance.

36,000 Sq. Ft. Taken at Detroit

DETROIT, MICH., Dec. 17—At the meeting of the members of the Detroit Automobile Dealers' Association, space aggregating over 36,000 sq. ft. was reserved by them for their exhibits at the coming Detroit automobile show. Non-members will draw for space in a few days, 23,000 sq. ft. being available. Exhibitors to date total sixty-nine.

Reliance Takes Michigan Crank Shaft

LANSING, MICH., Dec. 20—The Reliance Engineering Co., which recently took over the Seager Engine Works, has now also taken over the Michigan Crank Shaft Co., which started in business here in 1907 and the Emergency Forge Co., which was started in 1910.

Decision in Tire Cover Suit

NEW YORK CITY, Dec. 20—A decision has been issued in the case of the Allen Auto Specialty Co., against E. G. Baker, alleging infringement of patent No. 799,662 on a tire cover construction, the court of appeals reversing the decision of the district court and ruling that the patent is invalid for lack of invention. The district court decision held the patent to be valid and infringed by Baker. The construction at issue applies to a tire cover in the shape of an annular tube receiving the tire from the front and having all exposed edges of the cover overlapped in the same general direction to shed water. The natural next step on the part of the Allen Auto Specialty Co. is to apply for a writ of certiorari.

Jitneys Cost Massachusetts Trolley Lines $700 a Day

BOSTON, MASS., Dec. 18—President Gordon Abbott of the Massachusetts Electric companies, which control the Bay State electric street railways and several others in eastern Massachusetts, Rhode Island and New Hampshire, has just filed his annual report in which he states that the jitney bus business is costing his roads about $700 a day. The coming of the jitney has meant a loss in net operating revenue over last year of $445,634.99.

Moline Plow's Experimental Cars Near Completion

FREEPORT, ILL., Dec. 18—The experimental work upon the automobiles to be manufactured in Freeport by the Henney buggy branch of the Moline Plow Co., is about completed. The models are under construction in Detroit and will be shipped to Freeport shortly for assembling and painting. By Jan. 1 the cars will be ready for testing upon the street. It is presumed that some changes will be made following the tests. Material is being purchased and efforts will be made to place cars upon the market early next summer. J. T. Trumble of Detroit has been secured as chief engineer.

Brennen, Hale & Kilburn Mgr.

DETROIT, MICH., Dec. 18—C. H. Brennan has been appointed manager of the Detroit branch of the Hale & Kilburn Co., North Philadelphia, Pa., with headquarters in the Garfield Building, Woodward Avenue. The Pennsylvania company makes fenders, axle housings, frames and more recently has placed upon the market a steel automobile body, also a composite automobile body.

New Jobbing House in Milwaukee

MILWAUKEE, WIS., Dec. 21—The Shadbolt & Boyd Iron Co. of Milwaukee, Wis., is entering in the automobile accessory business and is purchasing a complete stock of automobile accessories. They request catalogs, price lists, etc. from reliable manufacturers of automobile accessories. This department is to be in charge of F. H. Suter, formerly with the Chicago Rubber Co.

Russell Amalgamation with Canadian Overland Ratified

TORONTO, ONT., Dec. 21—The shareholders of the Russell Motor Car Co., at a special meeting in this city, confirmed the amalgamation of the automobile business with the Canadian business of the Willys-Overland Co., Toledo. The assets transferred to the new company were valued on the books of the Russell company at $1,000,000. For this the company receives $1,000,000 preferred stock in the new Willys-Overland, Ltd., $1,000,000 in cash and $200,000 in common stock.

To Act on Ajax Dividend

NEW YORK CITY, Dec. 22—The directors of the Ajax Rubber Co. will meet next month for the purpose of considering the declaration of a dividend.

The Ajax Rubber Co. of Millbrook, was incorporated at Albany, for $5,000,000 by C. F. Lynch and W. J. Jackson, New York, and C. L. Morris, of Jersey City.

Saxon Has 2300 Orders

DETROIT, MICH., Dec. 18—According to R. C. Getsinger, sales manager of the Saxon Motor Car Corporation, the concern had orders on hand at the beginning of December for 2300 Saxon cars for immediate delivery. It is expected that the production will be more than 2000 cars for the month, or at least 500 more than originally expected.

Oakland Salesmen Meet

PONTIAC, MICH., Dec. 16—A convention of salesmen of the Oakland Motor Car Co., is being held at the plant here this week. Between thirty and forty men from all over the country are here and will be kept busy getting posted on the Oakland sales campaign for next year, its production arrangements, and other matters concerning the Oakland company, until Saturday.

Maxwell Dealers in Session

ST. LOUIS, MO., Dec. 16—Maxwell dealers from eighteen towns in southern Illinois and eastern Missouri braved the first sleet storm of the year to-day in order to attend the annual Maxwell meeting here. The entire sales force of the George C. Brinkman Motor Car Co., Maxwell distributors in this district, acted as host to the visitors.

New York Rotarians Invite Motor Men

NEW YORK CITY, Dec. 21—The Rotary Club of New York has sent invitations to the Rotarians throughout the country to join them at luncheon Tuesday, Jan. 4, at 12.30 p. m., at the Imperial Hotel. Speakers will be chosen from the automobile industry.

Factory Miscellany

Warner Co. Adds—The T. W. Warner Co. is constructing two additions to its plant at Muncie, Ind. The estimated cost is $100,000.

Western Auto Co. to Build—The Western Auto Co., Bremerton, Wash., contemplates purchasing a site for the construction of an automobile assembling plant.

Wichita Falls Motors to Build—It is reported that J. G. Culbertson, manager of the Wichita Falls Motor Co., Wichita Falls, plans to build a factory at Dallas for the manufacture of trucks.

Wheeling Co. to Build—The Wheeling Motor Car Co., Wheeling, W. Va., recently incorporated with $25,000 capital, will establish a plant for the manufacture of its specialty. G. M. Ford is interested.

Standard Crucible Adds—The Standard Crucible Steel Casting Co., 719 Thirtieth Street, Milwaukee, will erect a foundry addition at once to keep the production commensurate with orders. The building will be 40 by 80 ft., of brick and reinforced concrete. It is to be ready about Dec. 1, at which time the foundry force will be increased to thirty-five men.

French Battery Plant Fire Damaged—The plant of the French Battery & Carbon Co., 120 South Dickinson Street, Madison, Wis., was almost totally destroyed by fire on the night of December 1. The loss is in excess of $100,000. The company is a large manufacturer of dry cells, fuses and similar material, and has been filling large contracts both for domestic and export shipment. It is considered certain that the plant will be rebuilt at once to take care of a large volume of unfilled orders.

Milwaukee Ford to Open Feb. 1—It was announced on Dec. 1 by A. W. L. Gilpin, manager of the Milwaukee branch of the Ford Motor Co., Detroit, that no further applications for employment in the new Milwaukee plant will be considered under any circumstances. There are 400 positions to be filled by the time the new shops open on Feb. 1, and up to Dec. 1 the number of applications exceeded 3100. The Milwaukee plant is five stories high, 300 by 120 ft. in size, and will have a capacity of seventy-five cars daily. It will represent an investment of $385,000.

Bates Tractor to Add—Extensive additions will be made to the plant of the Bates Tractor Machine Co., located at the corner of Henderson Avenue and Jackson Street, Joliet, Ill. It is estimated that $100,000 will be expended upon new buildings and machinery. Orders now on hand aggregate 1000 machines and it is anticipated that next season's business will aggregate $1,000,000. By increasing the capacity of the foundry, sufficient steel castings can be produced to triple the output.

Goodrich Warehouse in Kansas City—The B. F. Goodrich Rubber Co. has obtained a lease on the five-story and basement Terminal Warehouse at Twenty-fourth Street and Broadway in Kansas City, Mo., and will immediately start alterations on it for immediate occupancy. This warehouse and storage will furnish the output for the entire Central Western business of the company and will be one of three new auxiliaries to the main plant at Akron, Ohio. All business in this Western territory will now come to Kansas City instead of Akron, a total yearly of about $2,000,000. The sales headquarters here will be under the direction of F. A. Oberhue.

The Automobile Calendar

Dec. 31-Jan. 8	New York City, Sixteenth Annual National Automobile Show; Grand Central Palace; N.A.C.C.
1916	
Jan. 1	Springfield, Mo., Show, Springfield Motor Car Dealers' Assn.
Jan. 3-9	Importers' Salon, Hotel Astor.
Jan. 4	New York City, N. A. C. C. Annual Banquet, Waldorf-Astoria.
Jan. 5	New York City, Motor and Accessory Manufacturers' Banquet in Evening at Waldorf-Astoria.
Jan. 5-6	New York City, S. A. E. Winter Session, Standards Committee Meeting.
Jan. 7, 8, 10, 11	New York City Convention National Assn. of Automobile Accessory Jobbers.
Jan. 7-13	Milwaukee, Wis., Show, Auditorium.
Jan. 8-15	Cleveland, Ohio, Show, Wigmore Coliseum, Cleveland Automobile Show Co.
Jan. 8-15	Philadelphia, Pa., Show, Philadelphia Auto Trade Assn.
Jan. 14-22	Dayton, O., Show, Delco Bldg., Dayton Automobile Dealers' Assn., and Dayton Accessory Dealers' Assn.
Jan. 10-15	Fort Wayne, Ind., Show, Auto Trade Assn.
Jan. 10-15	New Bedford, Mass., Show, State Armory.
Jan. 15-22	Detroit, Mich., Show, Detroit Automobile Dealers' Assn.
Jan. 17-22	Rochester, N.Y., Show, Exposition Park, C. A. Simmons, Mgr.
Jan. 17-22	Wilmington, Del., Show, Wilmington Automobile Show Assn.
Jan. 18-22	Baltimore, Md., Show, Fifth Regiment Armory.
Jan. 18-22	Lancaster, Pa., Show, Conestoga Park Pavilion.
Jan. 22-29	Montreal, Que., Show, Almy's Bldg., Automobile Trade Assn., Ltd.
Jan. 22-29	Chicago, Ill., Show, National Automobile Chamber of Commerce; Coliseum and First Regiment Armory.
Jan. 23-30	Portland, Ore., Show, Portland Automobile Dealers' Trade Assn.
Jan. 24-29	Buffalo, N. Y., Show, Buffalo Automobile Dealers' Assn., Broadway Auditorium.
Jan. 29-Feb. 5	Columbus, Ohio, Show, Memorial Hall, Columbus Automobile Show Co.
Jan. 29-Feb. 5	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Trade Assn.
Feb. 1-3	Frederick, Md., Show, Armory.
Feb. 7-12	Kansas City, Mo., Show, Convention Hall, Kansas City Motor Dealers' Assn.
Feb. 9-12	Peoria, Ill., Show, Coliseum, Peoria Automobile and Accessory Assn.
Feb. 12-19	Hartford, Conn., Show, First Regiment Armory, Hartford Automobile Dealers' Assn.
Feb. 14-19	Des Moines, Ia., Show, Des Moines Auto. Dealers' Assn.
Feb. 14-19	Winnipeg, Man., Show, Ford Plant, Winnipeg Motor Trades Assn.
Feb. 19	Newark, N. J., Show.
Feb. 20-27	Grand Rapids, Mich., Show, Klingman Furniture Exhibition Bldg., Automobile Business Assn.
Feb. 21-26	Louisville, Ky., Show, First Regiment Armory.
Feb. 21-26	Omaha, Neb., Show, Omaha Automobile Show Assn.
Feb. 21-26	Portland, Me., Show, Exposition Bldg.
Feb. 21-26	Syracuse, N. Y., Show, Syracuse Automobile Dealers.
Feb. 28-Mar. 3	Pittsburgh, Pa., Convention of American Road Builders' Assn., Mechanical Hall.
Feb. 29-Mar. 4	Ft. Dodge, Ia., Show, Terminal Bldg., Ft. Dodge Automobile Dealers' Assn.
March 4-11	Boston, Mass., Car and Truck Show, Mechanics Bldg.
Mar. 9-11	Mason City, Ia., Show, Armory.
Mar. 21-25	Deadwood, S. D., Show, Auditorium, Deadwood Business Club.
Mar. 28-Apr. 3	Manchester, N. H., Show, Under Auspices Couture Bros. Academy.
May 13	New York City, Vanderbilt Cup, Sheepshead Bay Speedway Race.
May 20	Chicago, Ill., Amateur Drivers' Race, Chicago Motor Speedway.
May 30	Indianapolis Track Race.
June 17	Chicago Track Race.
June 28	Des Moines, Ia., Track Race.
July 4	Minneapolis Track Race.
July 4	Sioux City Track Race.
July 15	Omaha, Neb., Track Race.
Aug. 5	Tacoma Track Race.
Aug. 18-19	Elgin Road Race.
Sept. 4	Des Moines Track Meet.
Sept. 15	Indianapolis Track Race.
Sept. 16	Providence Track Race.
Sept. 30	New York City Sheepshead Bay Race.
Oct. 7	Omaha Track Race.
Oct. 14	Chicago Track Race.

The Week in the Industry

Malany Is Worcester Chevrolet Sales Manager.—H. E. Malany has been appointed sales manager of the Marcy Motor Co., Worcester, Mass., which recently took over the agency for the Chevrolet.

Hebert Studebaker Supervisor—J. M. Hebert, formerly of San Francisco, has become Studebaker supervisor at Portland, Ore.

Dealer

State California News Items—The Chandler Motor Car Co. of California has opened branches and service stations at 125 East Third Street, Long Beach, Cal., and 317 East Colorado Street, Pasadena, Cal.

Negotiations are now under way for the establishment of a branch of the Ahlberg Bearing Co., Los Angeles, Cal., in Sydney, Australia. It is planned to ship machinery for regrinding bearings under the Ahlberg system to Sydney and supply the entire Australian trade from the factory branch.

$100,000 Overland Station in Toledo—The Willys-Overland Co. will erect a service station at Adams and Fourteenth Streets, Toledo, Ohio, which will be four stories high and will cost more than $100,000.

Cleveland Changes—The Poulson Rubber & Tire Co. of Kansas City has leased a manufacturing plant at Doan Avenue and the Nickel Plate tracks, East Cleveland, where it will manufacture tire supplies. Its removal to Cleveland is for the purpose of securing a good market for its product and because of better labor conditions. It is said the company will bring 200 families with it.

The Hills Motor Car Co., 6110 Euclid Avenue, has contracted to handle the Pathfinder cars in that city and the northern section of the State.

The U-Auto-Varnish Co. has moved its general offices from the Arcade building to its new quarters at 1027 Chestnut Avenue, where an entire building is occupied. The company operates a service station in the building where automobiles are painted and varnished.

The Ris Motor Co., handling the Dort, has leased space for an additional service station, which was occupied Dec. 10.

Fisk in Rockford—The Double-Tread Tire Co., located at 319 Cedar Street, Rockford, Ill., has added car repair work in addition to vulcanizing and general tire attention. The company has taken the agency for the Fisk tires.

Motor Men in New Roles

Hawley Branches Out.—P. E. Hawley, formerly manager of the Boston branches of the Studebaker and the King, has branched out for himself as a dealer and he has taken the Saxon for Eastern Massachusetts with headquarters at 889 Boylston Street, Boston.

Henshaw Adds Territory.—C. S. Henshaw has been so successful with the Dodge Brothers' line at Boston and Worcester, standing second on the factory books in total sales, that the company has allowed him to acquire Plymouth County also. This gives him nearly all of Eastern Massachusetts from Worcester to the ocean.

Porter Resigns.—J. S. Porter, formerly factory representative for the Regal Motor Car Co., Detroit, Mich., and who formed the Porter Motor Sales Co. at Boston, Mass., to handle the Regal and Pathfinder, has resigned from the company, and W. E. Cottrell is now in charge of it.

New Men for Stewart-Warner.—L. G. Reynolds, Jr., formerly of the National Cash Register Co., Dayton, Ohio, and Ralph Kaye of New York City, have joined the advertising department of the Stewart-Warner Speedometer Corp., Chicago., Ill., to assist Advertising Manager Gridley Adams.

Eads Goes to New York.—R. I. Eads, manager of the New England branch of the Premier Motor Co. until it was given up at Boston, Mass., has gone to New York, where he will enter business with an automobile company.

Coleman, Dallas Goodrich Manager.—G. P. Coleman has been appointed branch manager for the B. F. Goodrich Rubber Co. of Texas, with headquarters at Dallas.

Hendrick, Fisk Publicity Manager.—G. B. Hendrick of Winthrop, Mass., has been appointed manager of the newly created publicity department of The Fisk Rubber Co., Chicopee Falls, Mass.

Graham Gets Detroiter Appointment.—M. A. Graham has been appointed assistant to the advertising manager, F. M. Eldredge, in the advertising department of the Detroiter Motor Car Co., Detroit, Mich.

Pacific Coast Changes.—L. B. Merton of the Pacific Coast accessory firm of Hughson & Merton has been appointed general manager of that firm, and will hereafter be located in San Francisco.

Edward Johnstone, of the same organization, has been promoted from the managership of the Portland branch to the post as manager of the Northwest territory, including Oregon, Washington, Idaho, British Columbia and Western Montana.

Hughson & Merton will shortly add another branch to their chain of stores, at Spokane, Wash., which will distribute Ajax tires and accessories throughout the Inland Empire.

Dealer

Philadelphia Jackson Moves—The Jackson Automobile Co., 822 North Broad Street, Philadelphia, has moved to larger quarters at 933 North Broad Street.

Toledo Tire Co. Enlarges—The Toledo Tire & Supply Co., Toledo, has leased additional space on Madison Avenue and by means of an archway the new store room will be connected with the present quarters on Erie Street. The basement of the two buildings will also be connected.

New Washington Tire Co.—A new company has been formed in Washington, D. C., under the name of the Ramsdell Two-in-One Tire Co., with offices at 1802 Fourteenth Street, N. W. E. H. Ramsdell, president and general manager, was formerly general manager of the Double Mileage Tire Co., Buffalo, N. Y. The company will make a specialty of making a good tire out of two old ones. The process consists of sewing two old tires of the same size together. The bead or rim of one tire is cut off, and these tires, after being cemented together with a special compound, are stitched by a patented lockstitch process.

New Simms Service Stations—The following concerns have been appointed service stations for Simms magnetos and Simms-Huff electric starting and lighting systems: The Magneto Repair Co., 32 Tennyson Street, Boston, Mass.; Brown & Caine, 1517 Michigan Avenue, Chicago, Ill.; La Fer Instrument Co., 321 Frankfort Avenue, Cleveland, Ohio; Lord Motor Car Co., 1101 S. Hope Street, Los Angeles, Cal.; Stewart Automobile Supply Co., 247 Monroe Street, Memphis, Tenn.; Wisconsin Ignition Co., 509 Cedar Street, Milwaukee, Wis.; United States Automobile Supply Co., Thirteenth and Harney Streets, Omaha, Nebr.; Carlile & Doughty, 846 N. Broad Street, Philadelphia, Pa.; Seery & Morton, 201 East Sixth Avenue, Topeka, Kan., and S. G. Hoffman of 3937 Olive Street, St. Louis, Mo.